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Assembling Arctic Lifeways

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Assembling Arctic Lifeways

A relational approach to lithic assemblages from the Greenlandic
Dorset period

PhD thesis

to obtain the degree of PhD at the
University of Groningen
on the authority of the
Rector Magnificus Prof. C. Wijmenga
And in accordance with
the decision by the College of Deans.

This thesis will be defended in public on

Thursday 29th of April at hours 12:45

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Chapter 1 - Introduction

Starting with the arrival of people 4500 years ago, the prehistory of Greenland has seen several periods of human dispersals and abandonments. After the first people abandoned the island between 1200 and 900 BC, a second human dispersal around the island began circa 800 BC as groups of the Early Dorset culture from the Canadian Arctic crossed the Nares Strait into northwest Greenland. This staged a rapid dispersal along the glacier-free coastlines around the island that initiated a ~ 600-year period in Greenlandic prehistory. In earlier research, these groups were divided into two separate cultures, the Independence II of northern Greenland and the Dorset I in western Greenland. Recent advances in research have unified the two into the Greenlandic Dorset. These second pioneers came to live in diverse Arctic environments, from barren valleys and fjords in northernmost Greenland, through an alpine coast to the skerries and undulating hills of western Greenland, and onwards to a polynya icescape in northeastern Greenland. They built robust mid-passage dwellings for shelter and communion, and lighter tent constructions for respite during hunting trips. Their subsistence relied on the diversity of species that were present at different times and places throughout the year. Caribou and muskoxen were hunted and rivers rich with char were fished during warmer months. When coasts were seasonally frozen, sea-mammals were hunted prolifically on and along the edge of coastal ice sheets. To survive and thrive in these landscapes demanded a constant availability of portable and specialised composite tool kits. Maintaining these tool kits was therefore crucial. So far, the account of how these communities lived has centred on how the lithic components for tools were crafted. This research has worked to make standardised taxonomies for chronologically sequencing distinct technological traditions. However, by the same token it has reductively emphasised the lifeways of these communities as defined by highly conservative social behaviour. This thesis investigates their deeper dynamics by examining how lithics acted back on the choices and strategies of people. Previously understood as the products of a homogenous technological tradition spreading around Greenland, these human-material relations would in fact develop regionally different lifeways. With a Relational Approach, I want to focus on how tool kit curation required groups to respond to and balance the various challenges and opportunities that lithic materialities afforded. This will generate new interpretations that yields richer insights into the Arctic lifeways of the Greenlandic Dorset period.

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Figure 1: Map over Greenland indicating the areas of research in the present study. 1) Qeqertarsuup Tunua (Disko Bay); 2) Peary Land and adjacent areas; 3) Île de France and adjacent areas. Map by Edwin Bolhuis.

Portable tool kits have for millennia been essential to the dispersals and lifeways of highly mobile cultures across the circumpolar world. The prehistory of Greenland and the eastern Arctic vividly demonstrates this. With highly specialised composite tool kits, small bands of Paleo-Inuit¹ people dispersed in a series of separates waves into what some of us today might consider among the most extreme and remote areas of the planet. Following the initial peopling ~ 4500 years ago, the prehistory of the eastern Arctic involved numerous periods of regional colonisations, abandonments, and re-colonisations by different groups with different technologies and cultural traditions (Savelle and Dyke 2014). This is clearly seen in the archaeology of Greenland (Table 1).

Table 1: Culture-historical chronology of Greenland. Grey areas indicate de-populated periods. Based on (Appelt and Gulløv 2009; Grønnow 2017).

Years	West-Greenland	High Arctic Greenland	Ellesmere Island
1400 CE		Thule Inuit	
1300 CE			
1200 CE			
1100 CE	Norse	Late Dorset	
1000 CE			
900 CE			
800 CE
700 CE			
600 CE			
500 CE			
400 CE			
300 CE			
200 CE			
100 CE			
1 CE			
100 BCE		Greenlandic Dorset	
200 BCE			
300 BCE			
400 BCE			
500 BCE			
600 BCE			
700 BCE			
800 BCE			
900 BCE
1000 BCE			
1100 BCE			
1200 BCE			
1300 BCE			
1400 BCE			
1500 BCE			
1600 BCE			
1700 BCE			
1800 BCE			
1900 BCE			
2000 BCE			
2100 BCE			
2200 BCE			
2300 BCE		Independence I	
2400 BCE			
2500 BCE			

¹ The term Paleo-Inuit has replaced the former use of Paleo-Eskimo or Palaeo-Eskimo.

4 Introduction

The focus of my thesis is set on the lithic remains of composite tool kits involved in the second human dispersal around Greenland that began ~ 2800 years ago, defined as the Greenlandic Dorset period and technological tradition (Grønnow and Sørensen 2006; Sørensen 2012). Within a period of approximately 600 years (800 – 200 cal. BC), this distinct tradition was developed and afterwards rigidly sustained among small communities of people that dispersed through the vast and diverse Arctic regions of the island. This was a continuation of the Early Dorset cultural tradition that suddenly emerged in the eastern Arctic region of Canada around 800 BC, with the first remains known from the Foxe Basin area. The emergence of the Early Dorset is still unclear, and has primarily been discussed as either the result of cultural diffusion and migrations or regional ecological adaptations (e.g. Maxwell 1997; Savelle and Dyke 2014). What we can see, however, is that its origin initiated a rapid demographic dispersal across the entire eastern Arctic. Overall, the Early Dorset in the eastern Arctic is characterised by a hunter-gatherer economy specialised in sea-mammal hunting on and along sea ice, involving the use of highly ice-adapted technologies but without transportation technologies such as boats or dogsleds (Maxwell 1985; Nagy 2000). It is further characterised by a socio-economic organisation alternating between highly mobile forager strategies in warmer months, and more sedentary collector strategies during colder months (Jensen 2006b, 2016; Odess 1998).

As lithic remains comprise most of its archaeological record, it is through the study of lithic remains that the Greenlandic Dorset has come to be defined and understood as a distinct and uniform technological tradition that formed an internally coherent culture-historical chapter in Greenlandic prehistory. These remains indicate the broad assortment of lithic components that were used in specialised composite tools at time. The assorted lithic types include endblades for knives, lances, and harpoons; sideblades used as inserts in lances; scrapers for tools used for the working of hides and other soft materials; microblades for smaller knives used for finer cutting; adzes used in tools for preparation and initial shaping of organic materials; and burin-like components for tools used in the finer shaping of harder organic materials. Less descriptive but more frequent are types such as flakes, preforms, and nodules – the remains from the procurement, production, and maintenance of lithic components. It is by the similarity of lithic types and their modes of production through time that we recognise the Greenlandic Dorset as the easternmost extension of the Early Dorset culture.

The emergence of Greenlandic archaeology during the previous century was defined by a few archaeologists working separately in different regions of Greenland. In the research on the Dorset phenomenon specifically, two separate culture-historical definitions became established: The Dorset I of western Greenland and the Independence II of northernmost and northeastern Greenland. Although both were argued as offshoots of the broader Dorset culture in the eastern Arctic, they were for decades maintained as distinct cultural entities. However, the recent definition of the Greenlandic Dorset successfully erased the tenuous distinction between the two. This was achieved by Mikkel Sørensen (2012) through a technological study of lithic assemblages using the *chaîne opératoire* methodology. His employment of the methodology is based in a discourse where technologies are produced by human choices structured by social tradition (e.g. Apel 2001; Dobres 2010; Jordan 2015; Skandfer 2012; Sørensen, et al. 2013). These traditions are conceptualised and standardised by cognitively shared ‘schematics’ (*schema opératoire*) to which traditional modalities of technological production defers to and is maintained (Soressi and Geneste 2011:337). By regarding technology as social tradition, it has thereby become possible to define the spatial and temporal boundaries of cultural systems.

This way, the *chaîne opératoire* methodology has greatly contributed to recent developments in Greenlandic archaeology – especially in areas and periods where lithics are among the few available remains. Its principles have allowed redefinitions of distinct cultural traditions that were previously based on intuitive artefact typologies. Corollary, this has provided more meticulous and standardised typologies by which lithic remains can be ascribed to specific cultural traditions.

Furthermore, employing the *chaîne opératoire* has also allowed deeper interpretations of socio-economic organisation during the period through lithic study. As lithic remains can be categorised by their position in different stages of production and decision-making, the concept of traditionally shared mental templates has been used to map out human behaviour within dwelling areas and across local landscapes (Jensen 2006b:170). In the broader theoretical discourse of eastern Arctic archaeology, this has helped fuse an eco-deterministic ‘Nature-Culture’ divide (cf. Hood 1998). Different Paleo-Inuit cultures throughout Greenlandic prehistory are thereby viewed as created and maintained by the social reproduction of traditional knowledge that entailed culturally specific environmental adaptations– as opposed to mindless, mechanical reactions to environmental change.

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Thus, our current understanding of Greenlandic Dorset lifeways is based on the idea that these were sustained by fixed mental templates enacted by people on materials to reproduce standardised tool kit repertoires, which in turn supported environmental adaptation. This is a ‘Mind-Matter divide’, where the human mind (Culture) shape yet is unaffected by an inert material world (Nature). Lithic remains of Greenlandic Dorset tool kits—sorted as archaeological assemblages—have thus become representations of such standardised recipes of how people act out their traditions on the material world.

The continuity of artefact types through the period is consequently regarded as an outcome of people enforcing strict conformity to tradition. As a result, their lifeways are viewed as defined by great cultural conservatism (Sørensen 2012:343). The problem with this interpretation is that while it upholds a principal view of people at the time as being conscious and active agents, they are in practice engendered as static and ahistorical conduits of inherited cultural templates. Thus, the definition of the Greenlandic Dorset as a uniform technological tradition has removed real regional variabilities in the archaeological record from our understanding of the period – variabilities which might testify to the deeper dynamics of its lifeways.

This problem is not only the product of a Mind-Matter dualism, but also by a persisting research agenda oriented around the culture-historical sequencing of Greenlandic prehistory. This has dogmatised traditional culture-historical concepts, whereby continuity and change among prehistoric cultures are presupposed on diffusionist concepts that operate at the timescale of culture-history. People, materials, as well as the perceived and real non-human entities in the world are thereby reduced into products of culture rather than its co-creators (Fahlander 2017:70). This poses an ontological (how we perceive the realities of past Arctic societies) and an epistemological (how we acquire knowledge about these realities) problem.

The ontological issue is that this view ultimately perpetuates an ‘othering’ of the Arctic world that has characterised modern Western thinking (Herva and Lahelma 2019:10; Hood 1998:10-11). It reiterates a way of viewing Arctic societies as timeless and figuratively frozen in premodernity—as opposed to the Western south where societies “successfully” developed from hunter-gatherer and agrarian living to modern industrialised society. This project a reductive imagery of the Arctic as a remote and exotic world, where Indigenous people have always lived in a constant struggle to harmonise with an extreme environment. Cultural change can here only occur by external forces, such as environmental stress or interactions with more complex cultures.

Cultural continuity, on the other hand, becomes the result of past and recent Indigenous societies being morally dedicated and egalitarian custodians of social and natural order, i.e. ‘noble savages’. Such ontological projections have a deep and problematic colonialist legacy (see Rowland 2004).

The epistemological problem is that the culture-historical research agenda is detrimental to our ability and desire to give extant archaeological collections an active role in our narratives of the past. The archaeology of the Greenlandic Dorset is a good example. With a primary focus on improving archaeological taxonomies and establishing culture-historical sequences, earlier research has prioritised archaeological sites and assemblages that offers the best contexts and quantifiable, objective data. In other words, assemblages that offers representativity. This modernist pursuit for standardised taxonomies and chronological sequencing is inherently exclusive, exacerbating the ontological problem stated above. Due to factors such as differing degrees of natural- and archival taphonomy, as well as the employment of different fieldwork methodologies through research history, only a fraction of available assemblages from the period meets this standard. In this way, the remaining (and majority of) archaeological assemblages becomes relegated into artefacts of research history or anecdotal evidence that derive their interpretative potential from the efficacy of taxonomies.

To address these deeper problems, this thesis will attempt at replacing the predominantly Mind-on-Matter perspective on Greenlandic Dorset lifeways as defined by conservative social behaviour. Its goal is to produce a new interpretation of Greenlandic Dorset lifeways as constituted by dynamic relations between people and lithics that were active participants in the creation and maintenance of cultural tradition. As such, it is a perspective rooted in relational thinking. The present thesis is an extended exercise in applying a relational perspective to a particular circumpolar archaeological record that offers its own unique challenges and interpretative potentials.

The thesis therefore builds on moves now underway to harness the potential of relational thinking to innovate our understanding of the past and present northern circumpolar world (e.g. Betts, et al. 2015; Herva and Lahelma 2019; Hill 2011, 2013; Walls 2016). More generally, these new research developments build on the recent theoretical discourse of New Materialism that seeks to bridge modernist dualisms such as Subject-Object, Nature-Culture, and Mind-Matter (e.g. Fahlander 2017; Fowler 2013; Olsen, et al. 2012; Thomas 2015; Witmore 2014). Multiple theoretical frameworks have sprung out from this discourse, but each promote a relational view of

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the world where people, materials, and other non-human beings are regarded as potentially active participants. Rejecting the essentialism of modernist Western thinking, these frameworks uphold a view of agency as a relational and emergent property. Agency is thereby viewed as emerging through the contingent and situational interactions between human and non-human actors in the world – instead of as a property possessed exclusively by humans. Thus, relational frameworks encourage a greater faith in the archaeological material as a source of interpretation.

Whereas research on the relationality between past human and non-human actors in other circumpolar areas such as Fennoscandia (Herva and Lahelma 2019) has been able to draw on multiple lines of archaeological evidence, lithic remains by far constitutes the dominant part of the material record from the Greenlandic Dorset. The present thesis therefore contributes to this broader research agenda by introducing and exploring the efficacy of a Relational Approach for the study of lithic remains. This is necessary for a relational perspective on Greenlandic Dorset lifeways. The approach harnesses the methodologically advantageous elements of the *chaîne opératoire* while re-tooling its interpretative framework with concepts from relational thinking. Specifically, it draws from a branch of relational theory referred to as Assemblage Theory. A crucial premise of the approach is therefore that culture and history is co-created by things, people, and other non-human beings in the environment in ‘assemblages of relations’ (DeLanda 2016). Operating from this premise, the present thesis sets the focus on how the agency of lithics during the Greenlandic Dorset defined as well as were defined by their historically contingent relations to people and the composite tool kits wherein they played a role as tool components. These relations were in turn part of defining other interactions between people, materials, and their world. This will in turn allow interpretations of past people and lithic materialities as active participants in dynamic, situated, and historically contingent Greenlandic Dorset lifeways.

To give a better sense of where we currently stand in the archaeology of the Greenlandic Dorset and how we can generate new knowledge in the field through a relational perspective, I will now critically review the history of research on the Early/Greenlandic Dorset period. This outlines how the Dorset period became recognised and defined in eastern Arctic archaeology, how human living during its earliest stage—the Early Dorset—has been understood up until now, and leading up to the definition of the Greenlandic Dorset. This clarifies the problems that my thesis contends with and elaborate on prospective possibilities and challenges that stands ahead of this task.

1.1. A critical review of the research history on the Early/Greenlandic Dorset

The discovery and definition of the Dorset was made by Diamond Jenness in 1925 through an examination of artefact collections from northern Hudson Bay and the Hudson Strait (1925). At the time, any presence of people in the area prior to the Thule Inuit was mostly disregarded. The most compelling argument in favour of an eastern Arctic prehistory had thus far been made by Ole Solberg, who had proposed a Greenlandic ‘Stone-Age’ after his research on antiquarian collections of stone tools collected in western Greenland (1907).

Jenness’ inferences were based on the unfamiliar characteristics of about 500 artefacts. The advanced age of the artefacts was suggested by their deep brown patina. Their distinction from the material culture of the Thule was noted by the elliptically perforated holes seen among tools that had been made by gouging from opposing faces—distinguishable from the characteristic perforation by bow drill seen in Thule material culture. Other distinguishable characteristics of these collections included lithic endblades with concave proximal ends, asymmetrical bifaces, and assortments of lithic tools.

In the years to follow, archaeologists working across the eastern Arctic began to recognise archaeological remains of the Dorset (Ryan 2016:762). At the time, however, any remains older than the Thule Inuit culture would be deferred to as Dorset culture. With increased recognition of and research interest around the Dorset period, its chronological sequencing and origins would soon become disputed topics. This discourse is broadly defined as the ‘Dorset Problem’.

1.1.1. *The Dorset Problem*

The ‘Dorset Problem’ was first referred to by Collins (1958) and Taylor (1959) to describe the difficulties of asserting the Dorset origin, the diversity of its material culture, and its full extent in terms of geography and chronology (Ryan 2016:764). Its definition came at a time when archaeologists were striving towards establishing a consensus on the chronologies of human occupation in the eastern Arctic. A human prehistory in the eastern Arctic had only just been asserted following the discovery of the Denbigh Flint Complex in Alaska (Giddings 1951). The definition of the ‘Arctic Small Tool Tradition’ subsequently followed, proposed as the forerunner to the Dorset (Collins 1951).

Broader recognition of the Dorset as a unique cultural tradition in eastern Arctic prehistory emerged when a relative chronology between the Thule and the Dorset was proposed by Erik Holtved, who discovered sealed Dorset deposits beneath Thule deposits during fieldwork in north-west Greenland (1944). Shortly after, Henry Collins was the first to attempt at making an internal Dorset chronology by examining harpoon-heads from extant collections, as well as ones collected from recently excavated sites at Baffin Island (1950). This typological examination pivoted the first internal chronological sequencing of the Dorset.

A similar attempt was made by Jørgen Meldgaard following his fieldwork at Igloolik in Foxe Basin, Canada. This chronology was primarily based on the shoreline elevation of a series of sites located on raised beaches, sequenced from Dorset I to V (Meldgaard 1960). Meldgaard's chronological sequencing of the Dorset was a major step forward for eastern Arctic archaeology. At the 22-23 meter level of the shore elevation, Meldgaard noted a sudden appearance of ground slate tools while technologies such as the drill and the bow and arrow disappeared. To verify this sudden break in assemblage compositions, Meldgaard examined archived collections of earlier anthrogeographical studies made by H.P Steensby (1917) and K. Birket-Smith (1929). Inexplicably described as carrying a "smell of the forest" (Meldgaard 1960:95), a connection was drawn between the ground slate tools of the earliest Dorset and slate-using Archaic Indian cultures of the boreal forests to the south. Thus, the first people of the Dorset were not considered to have been primarily adapted to Arctic conditions. The disappearance of ground slate tools in subsequent sequences of the Dorset would then be explained by a progressing environmental adaptation, one that was possibly influenced by the 'pure' Arctic culture of the Pre-Dorset Saqqaq (Hood 1998:12-14).

At the time, Meldgaard, together with Helge Larsen, also provided evidence of a Dorset presence in western Greenland. Discovered as a layer of deposits between Pre-Dorset Saqqaq and Thule Inuit layers, this evidence helped build the first Paleo-Inuit chronology of Greenland (Larsen and Meldgaard 1958). However, the layer did not allow the construction of an internal Dorset chronology in Greenland. For decades, its deposits remained among the few ephemeral traces of the Dorset in Greenland. The Dorset chronology and origin thus lingered as open questions in Greenlandic archaeology. Meanwhile, these questions became central to the research discourse of Paleo-Inuit archaeology in Canada.

Following the assertion of the Dorset phenomenon in eastern Arctic prehistory, researchers became concerned with its origin and subsequent development. These discussions were primarily influenced by classical ethnography and traditional culture-history, while also presupposing the deterministic effects of the environment on Paleo-Inuit living (Hood 1998:14). With new archaeological discoveries in several regions across the eastern Arctic through the 1970s, and the inclusion of new data such as climatic information and radiocarbon dating, the ‘Core Area-model’ emerged as the leading theory on the Dorset origin. The model pivoted Foxe Basin as the most climatically—and thereby culturally—stable area throughout Paleo-Inuit prehistory. From this area, peripheral regions were populated via long-distance push-pull processes determined by the success of environmental adaptation (Ryan 2016:766). As the archaeological record of the Dorset expanded throughout the 1980s, this model would eventually become disproven. New findings in formerly considered peripheries of the ‘Core Area’ demonstrated that the duration of Dorset occupation in these areas were more continuous than presumed. As such, the binary relationship between demographic durations and climatic development was put to question (Hood 1998:19).

Meanwhile, researchers began to critically assess the premises of the Early Dorset culture-history. The debate mostly resulted in terminological reconfigurations to accommodate the fact that several established typologies were becoming inconsistent with chronological units (Nagy 1994:2-3). These discussions would highlight interpretative weaknesses and the difficulty for archaeologists working in the eastern Arctic to adequately define and explain cultural variations during the earliest Dorset. These issues were made even more challenging to solve due to methodological problems, such as the marine reservoir effect and the Hallstatt calibration plateau (Plateau E) between ca. 800-400 cal. BC that still to this day provide unreliable radiocarbon dates (Grønnow 2017:390; Ryan 2016:774).

Debates regarding the chronological outlines and transitions of the Dorset have persisted to this day (e.g. Desrosiers 2009a; Nagy 1997; Ryan 2016). With these, an emphasis on the importance of re-evaluating classical sites has emerged. However, the sustained premise of traditional culture-historical frameworks has not been addressed at much length. The discourse has rather aimed at addressing the unruly practice of treating taxonomic exceptions as temporal or regional variations in material culture. The refinement of chronologies is here presupposed on methodological rigour through improved contextual data from site stratigraphy and dating samples,

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alongside comparative studies of extant collections from type-sites that can define standardised taxonomies. The objective of these debates is summarised by Ryan as such:

“...researchers must seriously begin to challenge the increasingly untenable eastern Arctic Paleoeskimo sequence, revisiting sites used to define the transitional and Early/Middle/Late Dorset periods so that they can “be incorporated into new ranges of data not as exception, but as a recognized and normal procedure for placing classic definitions in their historical context” (Desrosiers et. al. 2006:140). Only after this, and following a serious measure of taxonomic introspection, can we begin to untangle the eastern Arctic’s complex history of human occupation” (Ryan 2016:775).

This call for methodological rigour echoes the concerns voiced by Plumet in the 1980s, who called for more objective, empirically detailed analyses of Paleo-Inuit material culture (e.g. Plumet 1980; Plumet 1982, 1987). His position beckoned the French tradition of Paleolithic archaeology at the time that began with the work of Leroi-Gourhan - a research tradition that initiated the development of the *chaîne opératoire* methodology that has become prominent in Western archaeology today.

Plumet argued for a more normalised, systematic approach to the material remains of Paleo-Inuit cultures (Hood 1998:22). This entailed the separation of research terminology that sought to avoid terms intuitively drawn from similarities with observations in classical ethnological research, and rather strive towards “objectively defined attributes” (Plumet 1980:38). For the analysis of lithic remains, this gave precedence for replicable experimental research to establish standardised and quantifiable taxonomies. Ultimately, the desired goal of such taxonomies was to provide more objective criteria by which culture-historical sequences could be made and changes in material culture explained (i.e. Inizan, et al. 1992; Plumet and Lebel 1997).

1.1.2. *Earlier critiques of prevailing interpretative frameworks*

Although eastern Arctic archaeology would move towards more methodological rigour from the 1980s and onwards, the concepts framing the interpretations and understanding of human living during Dorset prehistory received little critique. Research perspectives remained reliant on concepts and terminologies from traditional culture-historical and processual archaeology.

A seminal critique of this prevailing theoretical discourse in eastern Arctic archaeology has been made by Bryan Hood in his paper “Theory on Ice: The discourse of eastern Canadian Arctic Paleo-Eskimo Archaeology” (1998). The paper presents the first comprehensive critique of the

lacking development of interpretative frameworks in Paleo-Inuit archaeology. Specific issues addressed here include the pursuit of precisely standardised culture-historical units and the modelling of prehistoric cultural dynamics. This persisting emphasis produced two general models for describing and explaining the variability of cultural traits in the archaeological record: Normative historical particularism and eco-determinism. Hood summarises the two models as such:

“The first perspective is largely couched in traditional culture-historical terms of traits diffusion occurring in vaguely defined “contact” situations, while the second is marked by a strong environmental determinism which treats human behaviour rather mechanically in terms of biological populations” (Hood 1998:36).

A traditional empirical categorisation of Paleo-Inuit technology played a central role in creating and maintaining both perspectives. The two theoretical frameworks have largely relied on traditional typologies of artefacts, in which small shifts represented cultural change. Inherent to both perspectives is the treatment of Paleo-Inuit societies as static historical entities. As such, the development of Paleo-Inuit societies has been constrained to the level of culture-history by terms of migration or diffusion, or by the adaptational success or failure of societies in face of environmental change. As argued by Hood, these views have couched the discursive formation of “the North”, historically shaped and reified by conceptualisations made by researchers inhabiting “the South”. From this perspective, a separation between Nature and Culture has been a constituting element, scaffolding views of the North as a pure and fragile, yet precarious, environment where human life is only sustainable by the struggle to live in harmony with the elements (Hood 1998:10, 15, 35-36).

Another related factor that has shaped archaeological practice in eastern Arctic research history is the limited number of researchers in the field throughout its earlier decades. As in the pioneering phase of most fields of study, fieldwork in the Arctic was conducted for a long time by only a few prominent researchers. The research circles that formed around these individuals defined different archaeological practices in between regions, creating distinct conceptual signatures, recruitment networks, and citation patterns. This would begin to change from the 1980s and outwards. The field then began expanding due to a larger number of graduate students and researchers being admitted in American, Canadian, Danish, and Greenlandic research institutions (Hood 1998:22). Concurrently, concerns regarding gender and Indigenous participation increased.

People indigenous to the eastern Arctic began partaking in a different manner than before, mainly thanks to the establishment of local institutions that have nurtured closer relations between researchers and local populations and aided the recruitment of Indigenous people as researchers. This has contributed towards the dismantling of an archaeological practice where Indigenous people in the eastern Arctic were regarded as objects for ethnographic analogies to Paleo-Inuit prehistory (see Lyons 2016). Recent archaeological and ethnographic research in Greenland demonstrates the results of these critiques, with more active participation of Indigenous communities (e.g. Flora, et al. 2018; Walls 2016)

Ethnographic analogies have also played an important role in structuring the discursive formation of eastern Arctic archaeology (e.g. Grønnow, et al. 1983; Maxwell 1985; McGhee 1976, 1996; Taylor 1967). While the extensive ethnographic record of historical and modern Inuit societies has enabled a deeper level of interpretative detail, it has also created an impasse for understanding cultural dynamics where ethnographic research has been projected to markedly different prehistoric contexts. This has been especially problematic for research on periods where people rapidly dispersed into open, uninhabited landscapes – exemplified by the earliest Dorset, of which there are no analogies in eastern Arctic ethnography. Additionally, a recurring bias is seen in the selection of ethnographic parallels, with a general preference towards traditional “authentic” ethnographies and later studies of cultural-ecology, further contributing to the perpetuation of traditional and eco-functional perspectives on Paleo-Inuit prehistory (Hood 1998:25-27).

Discussions on the use of ethnographic analogies became more prevalent as the interest in reconstructing the social realities of the Dorset grew through the 1980s and 1990s (e.g. LeMoine 1996; McGhee 1996; Plumet 1985; Schledermann 1990). This research nurtured a growing recognition of the problematic reliance on traditional ethnography for constructing culture-historical frameworks and models of ecological adaptation. However, the emerging interest in Dorset social organisation became inconsistent with this critique, as researchers would still rely on classic ethnography for detailed interpretations of socio-economic organisation in prehistory. Thus, the explicit and implicit use of early ethnographic literature and economic concepts remained central components in interpretations of the Dorset periods, effectively reifying both the past and present human condition in the Arctic as timeless and fixed (Hood 1998:44).

1.1.3. *The hunter-gatherer economy of the Early Dorset*

The archaeological record of the earliest Dorset period mostly features material culture that is typically considered remains of ‘mundane’, everyday living. These include remains of dwellings, some faunal material, and tool technologies. Overall, it is by far the lithic remains of tool technologies that dominate the archaeological record. While interpretations on dwelling organisation have relied more heavily on ethnographic analogies, research on faunal and lithic remains have been more empirically driven. This has been due to the possibility of explicitly relating such remains to the environment through raw material provenance (e.g. Jensen and Petersen 1998; Nagle 1984; Plumet 1981) and ecological histories (e.g. Darwent 2001; Darwent 2004; Hodgetts, et al. 2003). The current understanding of human living during the period is predominantly based on these sources. Research on Early Dorset prehistory has therefore become framed by economic concepts, through which subsistence, mobility, and overall land use have been interpreted.

Through these concepts, the people living during the Early Dorset have been broadly referred to as coastally adapted hunters-gatherers, subsisting primarily on marine resources with emphasis on sea-mammals. Traditionally, scholars have argued that the development from Pre-Dorset traditions to the Early Dorset in the broader eastern Arctic involved a decreasing reliance on terrestrial species and an increasing reliance on marine species. Corollary to this perspective has been the idea of decreased mobility, based primarily on the apparent absence of transportation technology. While tentative evidence of single-person watercrafts from the Dorset period as a whole is known, no evidence of watercraft capable of carrying multiple passengers across open water have been found, nor has dog-sled technology (Maxwell 1985:136-137, 152-153).

Thus, the assumption remains that people during the Dorset periods must have relied on walking as a means of transportation, where even the sleds were pulled by people (Maxwell 1985:152). Movement across eastern Arctic landscapes has therefore been defined as more circumscribed than among Pre-Dorset cultures as well as the historic Inuit. Consequentially, this supposedly forced people into settling as small groups of fewer than ten individuals—presumably core family units—in areas where resources were highly abundant and localized. As a result, populations during the earliest Dorset period has been characterised as highly dispersed, separated by several kilometres of territory wherein individual groups operated (Odess 1998:420).

Furthermore, the pre-eminence of harpoon-technology—along with evidence of snow-knives and ice-creepers— in the record of organic artefacts has been essential in framing the generic Early Dorset group as more ice-adapted and coastally oriented than people during both the Pre-Dorset and the Thule Inuit periods (e.g. Darwent 2004; Maxwell 1985; McGhee 1996; Murray 1999; Nagy 2000; Odess 1998). In the traditional conceptualisation of Early Dorset living, groups typically inhabited sites for longer durations, indicated by semi-subterranean dwellings, employing low-risk subsistence strategies where locally abundant resources were intensively used (Darwent 2004; Odess 1998). Relocation would only occur when seasonal or climatic conditions in the area became unfavourable. As the earlier Dorset eventually developed into the Late Dorset, external pressure from Thule Inuit culture is argued to have been a key factor for an increased sedentism, as indicated by the emergence of larger dwelling structures (McGhee 1996:117). The prevailing effects of deterministic eco-functionalism and historical particularism on the perspectives of Dorset prehistory is clear.

Debates on these perspectives have primarily been stimulated by an expanding archaeological record, without much reconfiguration of theoretical frameworks to accommodate the expanding dataset. With the gradually increasing knowledge of regional landscapes and ecologies in the eastern Arctic, source-based interpretations (cf. Odess 1998) of hunter-gatherer living has played a central role in challenging the traditional understanding of the Early Dorset. These interpretations have primarily come from the analysis of lithic and faunal assemblages that can be associated with source-areas such as lithic outcrops and resource areas (e.g. Jensen and Petersen 1998; Milne, et al. 2012). In doing so, recent research has been able to underscore regionally diversified economic patterns of hunter-gatherer movement and raw material use during the Dorset period that runs contrary to the idea of a de-emphasis on terrestrial game such as caribou and muskoxen, as seen on Baffin Island where Dorset period caribou hunting is evident (Milne, et al. 2012:281-282).

Eco-functional, source-based descriptions and explanations of hunter-gatherer living during the earlier Dorset periods remains prominent to this day. However, in recent decades of research we can see a shift towards interpretations that are informed by theories of cognitive and social archaeology. This has resulted in a re-framing of interpretations, where the socio-economic behaviour among Early Dorset hunter-gatherer communities deferred to ideology and traditional knowledge.

1.1.4. *Explorations into the social realities of the Early Dorset*

From the 1990s and onwards, research prehistory of the eastern Arctic became gradually more concerned with what constituted and characterised the social realities *within* the culture-historical periods. Hood's critique of eco-determinism and historical particularism pivoted a call for moving the theoretical discourse towards concepts of social and cognitive archaeology. Ideology was here forwarded as the leading premise for cultural continuity and change. By this premise, the daily living of Paleo-Inuit people was conducted in deference to a culturally constructed social and natural world, thus bridging the ethnocentric Nature-Culture divide in eastern Arctic archaeological discourse. In this way, practice is understood as being conducted in a socially constructed world shared by humans, animals, and spirits. To describe and explain these worlds required an understanding of the "technical rules and ideological premises" by which human behaviour was conducted and transmitted (Hood 1998:47).

It would take several years for such concepts to become explicitly referenced in research on Early Dorset prehistory. The influence of social and cognitive archaeology can be seen in the eastern Arctic scholarship that emerged during the 1990s. An example is the research on the tenuous Pre-Dorset/Dorset transitional period by Murielle Nagy (1994, 1997, 2000). This research was firmly based in a critique of arbitrary culture-historical descriptions and explanations of the origins of the Early Dorset in the eastern Arctic.

To clarify the Pre-Dorset/Dorset transition, Nagy conducted analyses of 'transitional' assemblages from Ivujivik in Northern Québec, studying faunal, dwelling, and technological remains to describe 'land-use systems' (Nagy 2000:20). By eco-functional terms, these prehistoric land-use systems are defined along a spectrum of *forager* and *collector* strategies (cf. Binford 1980). Nagy interprets that the transition from Pre-Dorset to Dorset culture in Ivujivik entailed an adaptational development from highly mobile forager communities to more sedentary collector communities. This involved an increased specialisation of resources, predicated on cumulatively increased knowledge of regional landscapes. In this interpretation, hunter-gatherer development relies on the assumption that accumulating socially shared knowledge of the landscape was required for and inevitably resulted in cultural transformation (Nagy 2000:23). Along with this premise, hunter-gatherer knowledge of material culture is regarded as far more important for

cultural change and continuity between the Pre-Dorset and Dorset periods than the actual material culture itself (Nagy 2000:203).

Even in more recent discussions regarding the social realities of Early Dorset hunter-gatherers, explanations using concepts of social and cognitive archaeology are seldom explicated. Such concepts are rather used as shorthand to describe shared traditional knowledge within and between different regions. Technological studies of lithic assemblages are central to this discourse. An obvious reason for this is the abundance of lithic remains in archaeological assemblages. Another important reason is the possibility for source-based analyses of lithic material, which allow for more objective and direct links to be made between empirical observations and lithic landscapes (Hood 1998:44; Odess 1998:421-424). A third reason is the possibility to replicate and infer methods and techniques of lithic production through experimental research. Referring to experimental analogies has allowed researchers working across the eastern Arctic to identify specific techniques and methods that were involved in the social production of lithic technology (Desrosiers 2009a; Desrosiers and Sørensen 2012; Sørensen 2012).

The research interest on social and ideological aspects of Early Dorset prehistory have therefore subsumed into continued methodological efforts to more precisely and objectively distinguish and describe culture-historical variations in the archaeological record (e.g. Desrosiers 2009a; Sørensen 2012). The same applies for explanations of Early Dorset social realities, where such concepts are subsumed into eco-functional interpretations of how hunter-gatherers spatially organised resource procurement, settlements, and technological production across regional landscapes (e.g. Jensen 2006b; Milne 2011; Milne 2012). While this has helped to *describe* social realities of Early Dorset hunter-gatherers, little effort has been afforded to *explain* how the actors in these realities shaped cultural traditions. Instead, the social realities of hunter-gatherers are prescriptively explained to service the cohesion of standardised culture-historical units or models of hunter-gatherer ecological adaptation.

In such interpretations, the capacity of individual people or communities to respond and adapt to different or changing environmental and historical circumstances is rarely considered. Locked at the scales of culture-history and ecological adaptation, changes in hunter-gatherer living are described linearly by a presupposed notion that people were socially programmed to desire traditional knowledge of landscapes in order to maximise resource yield (cf. Nagy 2000:23). In my opinion, this has developed a discourse of ‘cognitive eco-functionalism’ in Early Dorset

archaeology, where archaeological remains have become representations of past social traditions that defined ecological adaptation. This characterises the recent technological studies by the *chaîne opératoire* that have pivoted redefined taxonomies of Dorset prehistory (e.g. Desrosiers 2009b; Sørensen 2012). With the theoretical premise of technology as social tradition, sequences of operation in technological production—the *chaîne opératoire* that people enacted—have been compared across time and between different regions to indicate similar or different social traditions. It is through such comparisons that the Greenlandic Dorset has become defined as a distinct tradition and culture-history in a broader Early Dorset context.

1.1.5. *From Dorset I to the Greenlandic Dorset*

Through most of the research history in Greenlandic archaeology, the Dorset phenomenon has been recognised as Meldgaard's Dorset I. Concurrently with the definition of a Dorset period in western Greenland during the late 1950s, the Independence II-culture of northernmost and northeastern Greenland was defined by Eigil Knuth. The two would for decades be treated as separate yet related cultural traditions (see part 4.2., Chapter 4). The distinction between the Independence II and the broader Dorset periods of the eastern Arctic was questioned soon after its definition (Collins 1958; Taylor 1968), but remained throughout the life-long career of Knuth regardless. Critiques against the Dorset I/Independence II distinction from within the research circle of Danish/Greenlandic archaeologists surfaced more prominently during the early 2000s. Amongst the first to problematise the distinction was Jens Fog Jensen, who highlighted the stylistic similarities among lithic types between the two cultural units (2006a). The debate on the culture-history of the Dorset in Greenland was thus reinvigorated.

Following a period of extensive fieldwork in western Greenland, where several new Dorset sites had been discovered (see Chapter 3, part 3.2), the chronology of and social reality during the Dorset was soon interpreted in his dissertation on the regional Paleo-Inuit prehistory (Jensen 2006b). In short, the geographical outlines of Dorset culture-history in Greenland—established as the early Dorset I phase—were critically assessed and the first comprehensive regional study of Dorset living in Greenland was provided. Jensen's conceptualisation of archaeological material as representations of social tradition was crucial to this achievement. As such, the view of social practice as a defining element of cultural traditions had a significant impact on the further development of Dorset archaeology in Greenland (Jensen 2006a, b)

This research moved the discourse beyond a reliance on stratified sites for establishing culture-historical sequences. Instead, Jensen demonstrated that such sequencing could be achieved by patterning and distinguishing technological and economic organisation between the Saqqaq and the Dorset I, ranging from the perspective of local sites to the regional perspective of Qeqertarsuup Tunua. With a focus on settlement organisation, dwelling styles, and lithic raw material use, social organisation during the Dorset I was mapped across its landscape. Two axioms for hunter-gatherer behaviour were postulated: The first being that hunter-gatherers located themselves near principal resource bases (Jensen 2006b:11), and the second being that similarities in behaviour referred to shared norms and knowledge, i.e. a shared ‘mental template’ (Jensen 2006b:170). As such, Jensen’s work innovatively combined eco-functional and cognitivist concepts to frame interpretations, similar to Nagy’s approach to the Pre-Dorset/Dorset transitional period. Spatial and economic patterns were ultimately generalised into ideologically shared practice that defined each respective culture-historical period (see part 3.2., Chapter 3). Explained by eco-functional concepts drawn from Binford (1980), people during the Dorset I of Qeqertarsuup Tunua lived by a “seasonally-oscillating collector and forager strategy; living in larger family camps throughout the winter, and dispersing into smaller single family units during the warmer months (Jensen 2006b:171)

Jensen’s work was a crucial step towards dissolving the distinction between the Independence II and Dorset I. Eventually, it was down to Mikkel Sørensen to seize this opportunity to redefine the Dorset phenomenon in Greenland. This was achieved through a study of Paleo-Inuit lithic assemblages from different regions of Greenland, compared through use of the *chaîne opératoire* methodology (2012). By doing so, Sørensen provided evidence indicating that the technological tradition of the Dorset I/Independence II was part of a shared continuum of Early Dorset culture in Greenland – unified as the Greenlandic Dorset. Apart from a brief presence of a Late Dorset tradition in northwest Greenland, this further asserted that the Dorset period in Greenland did not extend beyond its early phase—thus resolving its internal chronology on the island. Furthermore, it also helped in asserting that the Dorset in Greenland was not a continuation of the preceding Saqqaq culture, but rather emerged from a second pioneering phase occurring after a brief period of abandonment. However, the definition of the Greenlandic Dorset has resulted in a perspective on human living within the period as purely a projection of social tradition. This has effectively reduced the diverse human histories to a common denominator that was unaffected by dynamic interactions between people and their material world.

1.1.6. *The role of the chaîne opératoire in identifying and defining the Greenlandic Dorset*

With the definition of the Greenlandic Dorset as a unified cultural tradition, the origins of the Dorset in Greenland became tied to the arrival of people from Canada and through the Nares Strait into northern Greenland somewhere around 800 cal. BC (Grønnow and Sørensen 2006). This theory is based on the early absolute datings from the northernmost regions of Greenland, as well as the assumption that the migrating groups during the Early Dorset lacked adequate seafaring technology to cross large, open water. With their ice-adapted technology, however, the narrow strait between Ellesmere Island and Northwestern Greenland would have provided the most ideal topography for crossing. Soon after entering Greenland, people rapidly dispersed around the island. However, this process did not start immediately. Technological comparisons of lithic assemblages from Northwestern Greenland and Ellesmere Island suggest that several groups of people crossed the strait at the onset of the Early Dorset period in the Canadian Arctic. Remaining initially oriented around the North West Water Polynya, one of these groups eventually separated from the area to rapidly migrate around the entirety of Greenland via routes to the north and south (Grønnow and Sørensen 2006:65). Consequentially, the Greenlandic Dorset became a unique extension of the Early Dorset tradition and culture-historical period.

Sørensen's definition of the Greenlandic Dorset as a unique and uniform technological tradition has arguably demonstrated the merits of the *chaîne opératoire*. Through its use, it has been indicated that not only did people use similar tools across Greenland during the period—they produced these by similar techniques and methods of production. The continuity of similar lithic production therefore means that people shared the same 'mental template' (*schema opératoire*) to which their choices deferred during production (see Pelegrin 1990; Soressi and Geneste 2011). In other words, they adhered to and maintained the same cultural tradition (Figure 2).

Concept of production
(*Schéme opératoire*)

Group of people ('culture')
Individuals of different age and sex
living within the same social and
material tradition

'Les chaînes opératoires'
Artefacts from procurement to
production and discard

Figure 2: The Mind-on-Matter principle as illustrated by Sørensen (2012:37).

The concept of the mental template is crucial to the Mind-on-Matter discourse that has dominated *chaîne opératoire* research. Research that explicitly or implicitly subscribes to the concept has typically focused on the dynamics of social transmission (i.e. processes of learning) of technological knowledge and skill (e.g. Apel 2001; Jordan 2015), and studies aimed at defining social traditions to distinguish cultural change and continuity in prehistory (e.g. Desrosiers and Sørensen 2012; Pelegrin 2006; Sørensen, et al. 2013). In these studies, the degree to which social dynamics can be explained is often highly dependent on the contextual detail of excavated sites, the availability of varied and complex datasets in the archaeological record, and evidence of interactions between different social traditions.

In the archaeology of the Greenlandic Dorset, these factors are either limited to various degrees, or absent altogether. The available datasets are limited, as it is predominantly lithic remains that have been naturally preserved. The contextual detail of its archaeological assemblages

is highly varied, as archaeologists in Greenland have throughout research history operated by markedly different fieldwork practices within and between regions. Evidence of interactions between different cultural traditions is absent, as Greenland was abandoned by people before and after the period. The definition of the Greenlandic Dorset using a *chaîne opératoire* methodology is therefore not only important for the prehistoric chronology of Greenland but has also constructed a far more dynamic and standardised taxonomy that opens the possibility to further examine the available archaeological collections of the period.

However, this research has presented an understanding of Greenlandic Dorset lifeways that is more standardised than dynamic. Because the definition of the Greenlandic Dorset as a social tradition focuses on spatial and temporal similarities rather than differences, the continuity of tradition between regions and through time is explained as an outcome of a highly social conservative hunter-gatherer ideology (Sørensen 2012:343). Traditional continuity was achieved through rigid transmission of knowledge, whereby people were socially enforced to enact their daily lives in strict accordance with traditional knowledge. As this traditional knowledge also entailed a specific environmental adaptation, the continuity of social tradition was furthermore determined by its adaptational success. Defining an entire culture-historical period on the premise that past human living was entirely an outcome of social traditions has therefore inadvertently re-packaged historical particularism and eco-determinism.

1.1.7. *Moving beyond the Mind-on-Matter principle in chaîne opératoire research*

While descriptions of hunter-gatherer social traditions in terms of generalised, ideational human behaviour (i.e. mental templates) have gained much traction in the recent decades, concerns have been raised on how these descriptions conceptualise human living through archaeological material. Such concerns have become part of a movement in archaeological discourse generally referred to as ‘New Materialism’ (e.g. Thomas 2015; Witmore 2014). The discourse emerged as a critique on the division between idealised generalisations of human behaviour and social practice; a division of ‘Mind-Matter’ where mind and matter are separated in reality (Malafouris 2004; Walls 2016).

A consequence of this dichotomy has been the *a priori* treatment of archaeological remains as passive representations of human behaviour (Malafouris 2004:57). Research on past lithic technologies exemplifies this, as lithic remains have allowed archaeologists to interpret the early development of human cognition and culture (see Bousman 1993). As such, in the broader scale of

human history, the behavioural complexity inferred from lithic technologies has pivoted the understanding of how social organisation developed. However, this has also been presupposed on a dichotomy that separates mind from matter. To paraphrase Malafouris, such a separation represents a convention of human cognition where the mind is disembodied and detached from the external world, and where sensory information is passively stored as internalised representational structures and procedures. In turn, this internalised information (abstract knowledge) is cognitively manipulated as it is bodily (through motoric skills) materialised and externalised, and so manifested into a material culture that becomes an extension of the human mind.

Drawing on Malafouris' analogy to the computational simulations used to develop Artificial Intelligence, the human mind essentially becomes a 'ghost in the machine' that we reconstruct by symbolic, representational structures—or 'algorithms'—that support inferential logic and problem-solving (2004:54-55). However, while researchers on AI still struggle to develop machines capable of adapting their behavioural patterns to different physical environments (see Lindblom and Ziemke 2003), archaeological explanations of how past people responded to and impacted changing environmental and historical circumstances remain inadequate in scholarship influenced by cognitive archaeology. Conceptualising the development of human living by representational schemas of behaviour has fallen into a deterministic, ahistorical trap, where past people and archaeological materials are treated as static entities deterministically shaped by social tradition. The persisting reiteration of a modernist dualism of Mind-Matter, akin to the dualism of Nature-Culture (cf. Hood 1998), has therefore inadvertently reduced the agency of the myriad of actors that inhabited and inhabits the world.

1.2. Towards a relational perspective on Greenlandic Dorset lifeways

With the definition of the Greenlandic Dorset as a distinct culture-historical period based on a standardised taxonomy of a technological tradition, we are now better equipped to identify and compare lithic assemblages from the period. However, to activate their deeper interpretative potential we must move beyond theoretical frameworks built on modernist dualisms. To replace this static and thus problematic interpretation of Greenlandic Dorset lifeways, I will examine lithic assemblages from three different areas of Greenland with a perspective rooted in relational thinking. Materials are here regarded as materialities, acknowledging that these have properties that define and become defined by interactions with humans and non-humans (e.g. other

materialities) in their environment., This bases the key theoretical premise of my Relational Approach: That people have always to some extent acted on the demands and requirements exerted by materialities, and that these interactions were historically consequential.

The crafting, use, and maintenance of tool technologies were never entirely outcomes of people enacting traditional knowledge and practice onto materials—i.e. ‘mind on matter’—as materialities situated and structured their decisions and strategies (Malafouris 2004; Walls 2016). Materialities were historically involved in the shaping and enactment of lifeways—influencing when, why, and where human decision-making and experience took place by their own physical properties as well as by properties that emerged through relations with other materialities. To describe these relations through study of lithic assemblages, the methodology of the *chaîne opératoire* remains essential. It focuses the lithic analyses of the present study on identifying the sequences of events that defined the ‘life history’ of artefacts prior to their final deposition. As earlier *chaîne opératoire* studies of lithic assemblages have predominantly viewed these events as enactments of Mind-on-Matter, the life histories of lithic artefacts are typically defined by stages of production pertaining to mental templates. The Relational Approach instead views these events as embedded in and defined by decisions and strategies pertaining to *tool kit curation*. They were thus enacted in response to the contingent demands set by lithic objects themselves or lithics as part of composite tool materialities.

To harness the descriptive potential of the *chaîne opératoire* methodology to explain the effects that tool kit curation had on Greenlandic Dorset lifeways, the present Relational Approach will rely on concepts from Assemblage Theory (DeLanda 2016). Assemblage Theory provides a set of coherent conceptual tools that allows interpretations of human-material relations to be built from bottom-up descriptions of events that formed the temporalities of lithic remains. As they pertained to the curation of composite tool kits, these temporalities are interpreted as emerging through contingent ‘assemblages of relations’ between humans, materialities, and other entities in their environment. Such relations were defined by and part of defining other historically contingent relations at multiple scales and paces of time (see e.g. Fowler 2017; Hamilakis and Jones 2017; Harris 2017). These relations are treated as always historically unique but might take on similar form across time and space as they enter and leave other assemblages, i.e., different environments and/or historical circumstances.

My thesis applies the Relational Approach in three regional case-studies that each focus on a key geographic area of Greenlandic Dorset archaeology: Qeqertarsuup Tunua (Disko Bay) in Central West Greenland, Peary Land and adjacent areas in northernmost Greenland, and the island of Île de France in northeastern Greenland (Figure 1). These areas are distinct in terms of topography, environment, and research history. Their archaeological records are also uniquely different – pointing to how people, their technological tradition, and their portable materialities became situated in different ways throughout the Greenlandic Dorset period.

Combined, the archaeological records of these three regions comprise the majority of available lithic assemblages from the period. Most of these have yet to be re-examined following their excavation. By its emphasis on examining their past temporalities, my Relational Approach is designed to include archaeological collections that have been previously neglected due to representativity. This helps to provide a fuller picture of Greenlandic Dorset lithic technology. In turn, it becomes possible to investigate how lithic depositions during the period were formed by events that unfolded differently over time, demanding and promoting various human-material relations. This way, the present thesis subjects a substantial portion of available lithic assemblages from the Greenlandic Dorset to a fundamental re-analysis using new ideas and concepts. Based on descriptive, bottom-up interpretations of regionally unique lifeways that defined and were defined by human-lithic relations, it provides the most comprehensive synthesis of the period to date – including numerous artefact drawings and illustrations (available in appendices D, E, and F). This synthesis generates a new understanding of the Greenlandic Dorset, offering several key characteristics of how lithics as active participants in composite tool kit curation added significant structure to the pioneering Arctic lifeways that unfolded at the time.

1.3. Aims, Objectives, and Research Questions

As we have seen, Greenlandic Dorset lifeways are essentially viewed as the products of a uniform and conservative technological tradition. This is primarily due to a combination of the Mind-on-Matter framework of the *chaîne opératoire* approach and a persisting culture-historical research agenda. The goal of this thesis is to approach human-lithic relations to better understand the deeper and regionally variable dynamics of Greenlandic Dorset lifeways. Through revisiting both previously studied and neglected lithic assemblages from the period, it seeks to move knowledge on one overarching question:

- What role did human-lithic relations play in the creation and structuring of Greenlandic Dorset lifeways in three different regions of Greenland?

By asking this overarching question, new lines of understanding can emerge in the view of a relational perspective. To draw on the insights generated in the three case-studies, the final synthesis will re-assemble a new understanding of the Greenlandic Dorset through a series of secondary questions. These will help generate insights that emphasise the dynamics of how human-lithic relations structured its unique lifeways. They are as follows:

1. Does the standardised taxonomy of Greenlandic Dorset lithic technology (Sørensen 2012) adequately reflect the true and contingent variability of tool kit production, use, and maintenance during the period?
2. Does each lithic type reflect the need to perform individual kinds of tasks?
3. Would certain composite tool designs exert demands and need for standardised components more than others?
4. Beyond their functional roles, what other relational factors can explain why microblades are among the most frequently deposited components at Greenlandic Dorset sites?
5. Were lithic components produced and deposited as part of linear and highly localised sequences of production, maintenance, and tool use?
6. Did composite tool relations directly structure which knapping technique could be used?
7. Was lithic production and tool kit maintenance affected differently by different raw material properties?
8. Did prepared tool kits play a didactic role in the acquisition of skills and knowledge for younger members of the community?
9. Did tool kits structure practices of lithic procurement?
10. Was heat-treatment deployed consistently in lithic component production and maintenance?
11. To what extent was caching an essential part of tool kit curation strategies?

To develop this mission, the thesis must achieve three aims:

1. Critique the interpretation and implicit assumption of Greenlandic Dorset lifeways as defined by a highly conservative technological tradition.
2. Test and eventually replace this interpretation with a Relational Approach.
3. Generate a new perspective on the Greenlandic Dorset that highlights how its lifeways were created by contingent relations between people, lithics, and tool kit materialities.

To achieve these aims the thesis will need to achieve the following research objectives:

1. Apply theoretical concepts from relational thinking to move the study of lithic technology in a new direction that can solve its current interpretative issues. This will introduce and justify the benefits of a Relational Approach to the study of Greenlandic Dorset lifeways through lithic remains, upgrading the interpretative potential of the *chaîne opératoire* methodology with concepts from Assemblage Theory.
2. Apply the Relational Approach to three targeted studies at the regional scale. These case-studies will cover three unique regions that situate most of the current archaeological record of the Greenlandic Dorset period to investigate the historical and regional variability of its lifeways.
3. Zoom out to the interregional scale of Greenland and integrate insights from the three regional case-studies into a new synthesis of the Greenlandic Dorset, specifically aimed at its lifeways. The synthesis identifies and explains key characteristics of how people and stone-using composite tool kits co-created lifeways in different parts of Greenland during the period. It thereby offers a better interpretation of dynamics of human living during the Greenlandic Dorset period.

1.4. Structure of Thesis

To achieve the aims and objectives of the thesis, I have designed its structure as follows. Chapter 2 will outline the Relational Approach of my study that will allow me to contend with the current understanding of Greenlandic Dorset lifeways. This entails the introduction of how the agency of materials is understood within relational thinking, and subsequently the introduction and discussion of relational concepts from Assemblage Theory. These concepts are in turn used to upgrade the interpretative potential of the *chaîne opératoire* for the study of Greenlandic Dorset lithic technologies. As I will explain here, this approach will allow me to infer histories of human-

material and material-material relations and interpret how these contingent interrelations created regionally variable and dynamic lifeways during the Greenlandic Dorset period.

The first case-study in Chapter 3 includes three lithic assemblages from the archaeological record of Qeqertarsuup Tunua. Their analyses are presented and discussed following a summary of the regional environment and resource base and the history of research on the Greenlandic Dorset. The second and third case-study in Chapter 4 and 5 are similarly structured. Chapter 4 includes six lithic assemblages from Peary Land and adjacent areas, while Chapter 5 include eleven assemblages from Île de France. As my case-studies partitions the archaeology of the Greenlandic Dorset period into three of its key geographic areas, each case-study will answer a research question that directly address the archaeology of the targeted region.

In Chapter 6, the three case-studies will be synthesised into a general discussion to answer the primary research questions presented above. This will provide novel characteristics that broadly defines Greenlandic Dorset lifeways from a relational perspective. Finally, I will evaluate the approach and how it can contribute to future research on Greenlandic prehistory as well as to the broader fields of eastern Arctic and circumpolar archaeology.

Chapter 2 - A Relational Approach to the study of Greenlandic Dorset lifeways

Technological studies of lithic remains have been crucial to the recent definition of the Greenlandic Dorset, as such remains comprises the main archaeological dataset from the period. However, these studies have maintained a modernist research discourse centred around improving methodologies and culture-historical chronologies. In Greenlandic archaeology, this has been achieved with a chaîne opératoire methodology. This has produced a standardised taxonomy of Greenlandic Dorset lithic technology through identifying stages and choices involved in technological production that was shared by communities living in Greenland through the period. It has thereby been assumed that people shared a standardised mental template of behaviour imposed onto passive materials—a Greenlandic Dorset technological tradition. It is an assumption based on a Mind-on-Matter principle where materials do not act back on people. Furthermore, this principle has been employed in a traditional culture-historical research agenda. As was argued in the previous chapter, this has continued a framework of interpretation with problematic implications for how we perceive Arctic lifeways. This is reflected in the perspective of Greenlandic Dorset lifeways as defined by highly conservative hunter-gatherers; an interpretation that defers to the standardised taxonomy used to delineate the period. It therefore ignores the dynamic and varied ways in which people responded to and became situated in different Greenlandic landscapes. To achieve such insights, this chapter explores how a theoretical framework of relational thinking can expand the interpretative potential of the chaîne opératoire methodology. This will establish a Relational Approach that opens interpretations of how materials acted back on the choices and strategies of people. Specifically, it refines the core concepts of the chaîne opératoire with Assemblage Theory to enable a relational perspective to emerge from the study of lithic remains. From this perspective, dynamic interactions between lithics and people were important and active parts of ‘assemblages of relations’ that structured regionally and historically unique Greenlandic Dorset lifeways.

The *chaîne opératoire* methodology has been crucial to the definition and chronological sequencing of the Greenlandic Dorset technological tradition as a cultural variation of the Early Dorset through the study of lithic assemblages. However, its use of a Mind-on-Matter principle within a traditional culture-historical research agenda has inadvertently resulted in limited and problematic interpretations of people living during the period as ‘highly conservative’ hunter-gatherers (Sørensen 2012:343). It is an interpretation that essentially regards lithics and people during the Greenlandic Dorset as passive products of culture, incapable of shaping its development.

Whereas the previous chapter outlined the historical legacy of this interpretation and its deeper issues, this chapter will formulate a Relational Approach that can respond to these. Here, I will explore the potential of relational thinking as an alternative framework for interpreting Greenlandic Dorset lifeways through the study of lithic remains. Specifically, this involves upgrading the *chaîne opératoire* with concepts from Assemblage Theory (DeLanda 2016). Doing so will allow me to use conventional methods of lithic analysis to produce new relational perspectives on the Greenlandic Dorset period through bottom-up investigations of lithic assemblages. To address the research question of this thesis, these perspectives will specifically highlight how lithics in contingent assemblages of relations with people and composite tool kits structured Greenlandic Dorset lifeways.

Lithic remains are here the point of entry into relational interpretations of how people became situated and responded in different ways to their Arctic world during the Greenlandic Dorset. To allow this, it is necessary to clarify the stance this thesis takes on precisely *how* materials can be active participants in human lifeways. The first part of the chapter positions the theoretical premise of my thesis by briefly discussing the recent New Materialist debates on the definition of materials as materialities – pivoting the relational view on the agency of materialities as emerging through ‘assemblages of relations’. The following part elaborates on this view, introducing Assemblage Theory as the conceptual ‘tool kit’ by which I will build the Relational Approach of the present study. This part covers its fundamental concepts and how these differ from other relational theories.

Recent archaeological research has demonstrated the efficacy of Assemblage Theory for producing relational perspectives through typological and technological study of archaeological materials. The third part of the chapter therefore covers the broader interpretative implications of fundamentally reconfiguring how we investigate archaeological materials with concepts from

Assemblage Theory. I here explain how the present study is primarily centred on investigating the temporal patterns of human-lithic relations – relations that unfolded over multiple, non-linear, and relative scales of time. This segues into the fourth part, where I will establish the methodology of the Relational Approach as a conceptually re-configured *chaîne opératoire* approach to the study of lithic remains. This also serves to situate the present approach within recent developments in technological studies of Greenlandic prehistory. Finally, the chapter preludes the three case-studies by explaining how the approach is operationalised.

2.1. Materialities as active participants in the formation of culture and history

“All entities are participants within their own emergence (Whitehead 1978 [1928]; in Witmore 2012)”

The growing critiques of conceptual frameworks where materials are treated as by-products of socially constructed culture have helped develop perspectives on materials as co-creators of culture rather than its product (Fahlander 2017:70). Contributions to the archaeological debate from new materialist thinkers have gone to extensive lengths to discuss the role of materials, i.e. ‘things’, in the worlds inhabited by human beings. Not only do ‘things’ here play an active role in forming human cognition, culture, and history, but they are also capable of forming their own histories. In order to dissolve an ostensible ‘ontological divide’ between the human mind and the material world, this conceptualisation has become crucial. This movement of archaeological theory is by no means uniform, featuring a variety of theoretical frameworks built around metaphors such as ‘entanglements’ (Hodder 2012), ‘meshworks’ (Ingold 2007), ‘actor networks’ (Olsen 2003), and ‘assemblages’ (Fowler 2013). Despite their differences, they share a common cause in advocating that materials partake in active relations with humans and other non-human entities in the world, by which culture and history is created and perpetuated (e.g. Fowler 2013; Hamilakis and Jones 2017; Hicks 2010; Jones, et al. 2013). The debate on the similarities and differences between these frameworks is extensive and is best approached through the references cited above. I will here briefly review some key aspects of these debates.

Theoretical discussions in Western archaeology regarding the division between the material and cultural world have been greatly promoted by the introduction of Bruno Latour’s ‘Actor-Network Theory’ (2005). Latour’s theory became central to the discursive formation of a

‘symmetrical’ archaeology (e.g. Olsen 2003, 2012; Olsen, et al. 2012; Webmoor 2012; Witmore 2007, 2014). This discourse has promoted a shift of emphasis where agency is no longer reserved for humans but is also possessed by material things and other non-human entities in the world. For symmetrical archaeology, material has inherent qualities that matter outside of human interaction, “possessing their own capacities and inhabit their own compartments; in short, they have at least partial autonomy and transient essences (Olsen, et al. 2012:16, 19)”. Although researchers such as Gell (1992) had already argued that things could attain roles as secondary actors to ‘index’ human agency (Hicks 2010:77), Bruno Latour’s theory of the world as interwoven networks of relations that emerge from the actions of humans and non-humans elaborately critiqued the human exceptionalism that has persisted in social theory. Social life and practice are thereby not to be defined first and foremost by human agency, making it necessary to acknowledge the agentic qualities of non-human entities. To accommodate this perspective on the role of materials in the world, the term ‘materiality’ has been forwarded to replace ‘material culture’ as the object of study for archaeologists. The goal of this replacement has been to counteract the perceived human exceptionalism of ‘material culture’ where material can only be considered meaningful and representational when interacting with human culture.

The “otherness” of materiality espoused by symmetrical archaeology has been criticised by Ingold (2007) as being excessively universalist and abstract in its attempt to explain the role of things in the world. Ingold’s ardent confrontation with the idea of replacing ‘material culture’ with ‘materiality’ is predominantly centred around its concept of material agency, whereby he considers its argument for the agentic capacity of things as fetishist—essentially imbuing human properties to objects (Ingold 2007:11). A simplistic analogy for the concept of materiality that Ingold critiques is that each thing possesses its own self-contained and predetermined recipe or algorithm that determines its role in the world. This points to the anti-materialist thinking inherent in symmetrical archaeology: Despite distributing agency between humans and non-humans, it still relies on transcendental essences to explain the world. For Ingold, materials do not take an active part in the creation of practices and living in the sense that they possess agency. Rather, agency requires ‘skill’; a property reserved for living beings that grow and develop through life. The anti-materialist thinking is also present here, where the essence capable of creating the world is possessed by living beings that can take conscious action.

Assessing Ingold's critique of materiality, Fredrik Fahlander claims that the discussion on agency and materiality by Ingold and his counterparts in symmetrical archaeology has misunderstood a key aspect of Latour's actor network theory, whereby things are not social in themselves by possessing intrinsic, essential properties. Instead, socialness emerges from the *relations* between actors, both human and non-human (Fahlander 2017:74). This is a fundamental tenet of relational thinking.

A similar assessment is made by Dan Hicks, leading up to his explanation of how the very concept of agency itself is historically situated within the premises of phenomenological, post-structuralist thinking: "Agency only emerges as a problem to be solved if we hold on to a particular model of society in which, in the terms of dialectical material culture studies, the question of locating the human actions that generate, and are shaped by, social structure is significant (Hicks 2010:78).

In order to move from treating things as representational towards acknowledging their participation in the formation of history, Hicks explains how materials can be defined as *events* and *effects*. Defining things as *events* does more than just satisfy the representational inclination to describe social organisation and meaning in particular moments of time. Instead, things are treated in a way where even apparently inconsequential objects can potentially shape history by merit of their own properties. The explanation of things as *effects* is oriented around how "permeabilities as well as just relations constitute the emergence of the world as assemblage (2010:89)". The definition of things as effects is obtuse but explains how the participation of things "as events" affects and is affected by material practices across time. Such an understanding of things is described as 'less-than-social' by Hicks (2010:83).

This description has a twin in assemblage thinking, which is that of things as 'more-than-representational' (Fowler 2017:105; Harris 2017:132). Both definitions attend to the *contingencies* of how things, behaviour, practices, and structures were formed, changed, and maintained; contingencies where the physical properties of things and the materials from which they are made (i.e. assemblages of assemblages) exert influence. Things can therefore constitute historical contexts that are not entirely derivative of human or social relations, and the agency of both humans and things are regarded as a property that is situational rather than possessed as an essence.

Similar to the definition of things as events and effects, defining materiality as assemblages is to promote descriptive, empirical accounts of active relations between humans and materials,

while simultaneously explaining how these relations emerged historically (Harris 2017:129). On the other hand, scholars operating from the framework of symmetrical archaeology argue that it is only the description of these relations that should be our main concern (e.g. Olsen, et al. 2012; Witmore 2007). Symmetrical archaeology, with its orientation around Actor-Network-Theory, remains focused on describing the resulting form, rather than explaining processes of formation.

Metaphorically understanding the materiality of materials as assemblages of relations instead focuses interpretations on the formation of history, through explaining how relations between humans and non-human beings are formed, maintained, and broken (Harris 2017:134; Lucas 2012:196). Assemblage theory therefore include not only the idea of relations in a ‘flat ontology’, where no actor nor scale of description is presupposed to hold an exceptional position, but also provides concepts to explain how these relations emerge historically. For both humans and materials, agency is not possessed as a totalised, essential property, but an emergent property that is always contingent. In this manner, inferences of both intended and unintended consequences become equally important when interpreting human-material relations from archaeological remains (Harrison, et al. 2013:17).

For people during the Greenlandic Dorset, who consistently relied on composite tool kits, their histories of living around Greenland were not entirely defined by their traditionally shared knowledge, but nor did these materialities exert demands entirely by themselves. The becoming of histories and lifeways was co-created by knowledgeable and skilled people *in contingent relation* to the demands and requirements of materialities. These relations did not exist in a vacuum either, as they defined and were defined by multitudes of other historically and environmentally contingent ‘assemblages of relations’. The theoretical premise thus grounds a bottom-up approach that specifically aims at interpreting how lithic materialities were involved in shaping people’s lifeways at various scales.

To summarise and reiterate, this study operates from the premise that materials promote and demand responses from people. This premise sets the focus on contingency rather than intentionality. Contrary to the theoretical premises of previous research on Greenlandic Dorset lithic technology, the ‘minds’ of people were never entirely projected onto nor unaffected by materials. As materials promoted and demanded various responses, people would have to act accordingly to achieve a desired outcome (i.e. the production of a lithic component for a specific tool).

In the next part, I will elaborate on the nomenclature and concepts of Assemblage Theory, and how these distinguish it from other prominent theories in relational thinking. The following part discusses and explains how the use of typologies and the *chaîne opératoire* methodology is reconfigured within this framework. The final two parts then proceed to explain how this approach is operationalised for the study of lithic assemblages from the Greenlandic Dorset period.

2.2. Assemblage Theory and archaeology

For archaeologists, the term ‘assemblage’ most often conveys two meanings: One is the aggregation of objects that are similar in raw material, such as an assemblage of lithic artefacts, or objects that share typological, stylistic, or technological similarities, i.e. burins or microblades. The other is the aggregation of diverse objects that share a distinct context of variable scale, such as the archaeological assemblage of a dwelling or the archaeological assemblage of a chronological phase (Hamilakis and Jones 2017:77; see also Lucas 2012).

Assemblages have in recent years of archaeological research become more frequently discussed in ways that challenge conventions in archaeological discourse (e.g. Fowler 2013; Hamilakis 2013; Hamilakis 2017; Hamilakis and Jones 2017; Harris 2014, 2017; Jones, et al. 2013; Lucas 2012; Thomas 2015). Central to these discussions is the re-configuration of key elements in the archaeological discipline, including the rethinking of archaeological practice (Lucas 2012; Thomas 2015; Witmore 2014), scale (Harris 2017), typology (Fowler 2017), and sensoriality and affectivity (Hamilakis 2013; Hamilakis and Jones 2017). Broadly speaking, what can be considered a shared notion in this recent scholarship is that “An assemblage is a specific arrangement of diverse, heterogenous, interacting components that has specific *effects*; an assemblage acts, and acts in a way that none of its components can without being in such a configuration (Fowler 2017:96)”. In other words, assemblages are “made up of more or less heterogenous components, they are gatherings that act back on, but do not totally define, their constituent parts (2017:129)”. Thus, the concept applies well to archaeological assemblages—each different by its composition of types, technological characteristics, material and depositional histories, and not least by site preservation and curation.

In part of what is broadly referred to as an ‘ontological turn’, recent relational theories on assemblages emphasise that we should be confident enough to assert the reality of the world and to speculate about its character. It advocates that the world does in fact exist independently of

human thought and culture (Thomas 2015:1290). Thus, it explicitly critiques the separation between ‘Mind’ and ‘Matter’. For archaeological practice, this involves a consideration of interpretations of past cultures as ideas that emerge from people interacting in assemblages of relations with archaeological artefacts, site reports, museum archives, analytical equipment, radiocarbon datings, shoreline-placements, drawings, photography, etc. (cf. Fowler 2013; Harrison, et al. 2013; Hicks 2010).

In this thesis, the assemblages in focus are collections of lithic remains that were part of or otherwise associated with portable composite tool kits during the Greenlandic Dorset. These tool kits constituted materialities where lithic raw material was shaped into components and fitted with other components typically made from organic material, i.e. bone, ivory, or wood, to create composite tools (see Jensen 2016).

Stone-using tool kits of the Greenlandic Dorset can easily be conceptualised as assemblages of assemblages. They typically include a variety of specialised tools assembled using components crafted from different raw materials. The production and maintenance of lithic components would be recursive to the physical properties and life histories of other types of material to produce a variety of composite tools. The tool kit assemblage would in turn be part of assemblages of relations involving people, composite tools, animals, and the landscapes they inhabited. Another example is the relations between people, raw material, and composite tools that affected when, where, and how production and tool maintenance occurred. People, composite tools, and other non-human beings and things (i.e. animals and raw material) were thus bundled up in assemblages by which historically unique lifeways were perpetuated and developed.

As a branch of relational thinking in general, Assemblage Theory upholds that relations do not *a priori* shape living and history at separate scales (i.e. the individual – social field – structure). Rather, relations emerge from assemblages that relate in various degrees between a range of different levels. They are uniquely created by multiple converging histories that operate at various relative levels of scale.

Among those that have gone the furthest to elaborate Assemblage Theory is Manuel DeLanda. In his dissemination on the subject (DeLanda 2016), he presents several concepts that makes it an accessible and applicable framework for studying how archaeological materials were active participants in the formation of prehistoric lifeways. These concepts builds on Deleuzian thinking (Deleuze 1988; Deleuze and Guattari 1983 [1972]), which emphasises the becoming,

historically contingent, locally differentiated, relational nature of the world (DeLanda 2016:9-10). The most important of these include *emergent properties*, *relations of exteriority*, *downward causality*, *territorialisation*, and *coding*. These concepts will now be explained to appropriately establish the specific relational framework of the present study.

2.2.1. *Emergent properties*

In assemblage theory, history as well as things are treated as the products of interactions between parts that make wholes—wholes that ‘act’ back on their parts. Such parts can be any entity that has become part of a larger whole, i.e. a lithic component inserted into a composite tool. However, the composite tool would not *totally* define the identity of the lithic component. As an example, we can consider the retouched microblades that were produced and used as inserts for composite knives during the Greenlandic Dorset (see part 2.2.2., Figure 4). The definition of these types is contingent on factors such as morphology (the elongated, narrow shape), morphometric (e.g. width-to-length relation), and technological attributes (e.g. retouch or intentional breaking). These are observable ‘parts’ that define but are themselves not totally defined by the specific type of object and its variant. The interactions between these attributes are key to our interpretations regarding the relation between the microblade and other assemblages, e.g. as part of a crafted microblade knife tool or part of waste depositions from microblade production. These interactions constitute the *emergent properties* of the object that influenced its role prior to its deposition, as well as influencing how we categorise and interpret the object after its excavation.

2.2.2. *Relations of exteriority*

To better understand how an assemblage of parts defines and are defined by the relations of these parts to a whole, one must recognise the *relation of exteriority* that these can make up or be influenced by. Rather than purely defining a lithic component by its relation to a composite tool or a specific stage of lithic production, it still exists externally as an individual, independent entity with intrinsic yet contingent properties. The same applies to the composite tool, which after having been produced becomes an individual entity ‘external’ from its component parts. This thinking can be applied to any level of scale. For example, where a social community must consist of multiple individual persons to become a recognisable, historically characteristic entity, but does not totally

define nor is totally defined by the individual persons that constitute it. In this way, Assemblage Theory seeks to dissolve reductionism at any level of scale, be it micro or macro. Relations of exteriority as a concept is an important difference between Assemblage Theory and Actor-Network theory. In Actor-Network theory, it is only the connections and associations between individual actors in networks that matter. Because agency can only be created by actors connecting into relations that produce ‘actor-networks’, the possibility that agency can be influenced from outside of direct relations is neglected (Hodder 2012:93; Müller 2015:30-31).

The irreducibility in assemblage thinking serves to replace ‘seamless totalities’, where parts of the totality become merely its by-products (i.e. epiphenomenons), making its properties essential or transcendental. If an individual whole is treated as such, it is imbued with an ‘essence’ that exists in another plane of reality separate from the parts that constitute it (see previous part). It is by avoiding this that the concept of assemblages is treated in a scope of realism rather than idealism: assemblages whose properties emerge from interactions between assembled parts whose relations exist and endure contingently (DeLanda 2016:12).

2.2.3. *Downward causality*

Because each part that makes up a whole has its own emergent properties, their assemblages are always heterogenous. However, each part (e.g. a specific lithic type) can appear as highly homogenous. This is explained by the effects an assemblage may potentially have on its constituent parts, referred to by DeLanda as *downward causality*: “Assemblages emerge from the interactions between their parts, but once an assemblage is in place it immediately starts acting as a source of limitations and opportunities for its components (2016:21)”. It is a double-determination, where wholes (i.e. a composite tool, a community, or a typology) emerge from the bottom-up but exert a top-down influence on its parts (i.e. tool components, persons, the type categorisation of archaeological artefacts). This helps to explain how most assemblages appear to emerge ‘after the fact’; after the whole has already been set in place. On the other hand, the bottom-up effects are necessary to make assemblages *immanent*, in that the properties of a whole rely on the interaction of its parts, and would cease to exist if the parts stopped interacting (DeLanda 2016:21). To illustrate this more explicitly: If the physical properties of the lashing and glue attaching a lithic component to a haft deteriorates, the composite tool would become useless. If people in a community fail or refuse to abide by rules and norms without correction, the community

deteriorates. When a typology fails to correctly distinguish actual artefact types, it becomes redundant.

2.2.4. *Territorialisation*

To explain the degrees to which assemblages are homogenised by either top-down or bottom-up causation, two concepts become important: *territorialisation* and *coding* (DeLanda 2016:22). Territorialisation refers to the degree to which an assemblage homogenises its own components, both spatially by defining its spatial boundaries, and temporally by defining the degree to which the components derive from a homogenous repertoire. A useful example of territorialisation in the production of composite objects is presented in part 4.4.6., Chapter 4, demonstrated by the refitting of a lithic sideblade and a cloven hoof lancehead made from muskox bone. The design of the original composite tool is here observable, indicating how a purposeful design of the sideblade insert was considerably committed to the design of the lancehead. In this sense, the fitting of the sideblade into the lancehead was largely contingent on the size of the grooved slot. If a person desired to repair or maintain a specific cloven hoof lance, they would necessarily have to design new components according to the previous relations constituted by the composite tool. The design or form of the composite tool thus contributed to territorialise the design of the lithic component.

The concept of territorialisation can be compared with Hodder's concept of dependency in his theory of 'entanglements' (Hodder 2012). Entanglements between people and materials creates and sustains dependencies in material-material and human-material relations, which also entangles abstract ideas and knowledge (Hodder 2012:112). Tracing entanglements makes it possible to describe the contingencies in how history unfolds (Fowler 2013:40). However, Hodder also argues that entanglements unfold directionally, where people inevitably become increasingly dependent on these entanglements. While we can assume that people were dependent on portable tool kits during the Greenlandic Dorset, any individual tool kit would never have been constant. Tool kits would have been continuously territorialised and de-territorialised as its repertoires of tools were crafted, maintained, broken, and repaired. From these events, situational and contingent affordances appeared and disappeared, instead of accumulating dependencies (Fowler 2017:102; Hamilakis 2017:175).

By emphasising affordances, we can interpret how the territorialisation/de-territorialisation of tool kits were part of manifesting *desires* among people that stabilised certain aspects of their

living while at the same time de-stabilised others. Through a focus on desirability as an outcome as well as co-constituent of human-material relations (Müller and Schurr 2016:226), we are better equipped to interpret how events of lithic tool production, maintenance, and discard were outcomes of past interactions that simultaneously constituted (un)desirable future interactions between people and their worlds (Collins 2018:3). Assemblage Theory thereby provides a more dynamic framework for explaining the historical consequences of contingent human-material relations (Fowler 2013:39-40; Hamilakis and Jones 2017:82-83).

2.2.5. *Coding*

Coding refers to how particular assemblages can achieve a special status in fixing the identity of other assemblages that is part of it. To explain the concept of coding, DeLanda relies on examples from modern and historical times, such as how a constitution can define how a state creates and maintains laws that affect the communities and organisations inhabiting it. For hunter-gatherers living in the Arctic, eco-functional perspectives have deterministically pivoted the environment as the primary ‘coder’ for continuity and change in ostensibly hunter-gatherer groups living in these regions. Where concepts from cognitive archaeology have become mainstream in research discourse, cultural tradition has replaced the environment as the primary coder of cultural developments, whereby technological continuities of material expression observable in the archaeological record necessarily become indicative of highly conservative traditions.

With Assemblage Theory and its rooting in relational thinking, the present thesis does not seek to discredit either the environment or social tradition as significant coders for human living during the Greenlandic Dorset. Rather, their significance was always contingent. The bottom-up framework of analysis used in my approach provides the means to identify how the material remains available for study took part in co-creating dynamic and active tool kits that defined and were defined by human-environmental relations and social tradition. In this way, the approach considers not only archaeological material as more-than-representative, but also considers the lifeways of people as shaped by more than just the environment or by social norms and rules, by focusing on how their formation and becoming was influenced by lithic materialities.

2.3. From typologies, via the *chaîne opératoire*, to assemblages of relations

A theoretical reconfiguration of how typology and the *chaîne opératoire* is operationalised is crucial to the relational perspective of the present study. It shifts the interpretative focus towards the historically contingent relations between people and lithics, which defined and were defined by other interaction and historical development in a shared reality. Within the theoretical framework of the present study, this will help to better conceptualise the historical processes and relations from which past dynamics of human living emerged. A crucial question regarding how we use typologies has been stated by Sørensen (2015):

“Might we begin to explore the answers to such question through reconciliation with what the very physicality of objects actually means, including how their production can make reference through time and space, and how due to such links objects have a special kind of permanence and duration?” (Sørensen 2015:93).

The question specifically addresses how archaeologists rely on the properties of things, risking either that things are conceived as evolving by their own rights exclusively or that objects are considered static and reduced to representing human performance exclusively. To avoid this, Sørensen emphasises the importance of the dynamics between people and objects, and how things are produced in manners that situate them within the networks of agents that shape these dynamics (Sørensen 2015:92). Therefore, typologies can become an effective tool for identifying patterns that can aid in explaining the ‘how’ and ‘why’ of the archaeological assemblage, and not just where the archaeological assemblage belongs in a culture-historical sequence.

Chris Fowler has proceeded this discussion by framing it more explicitly within relational thinking. Through the use of Assemblage Theory, Fowler suggests that typology can be utilised to infer the unique history of each individual artefact while also treating it in relation to a prescribed type category. As archaeological artefacts and remains in general do not always consistently adhere to specific typological categories, explanations of why recognisable artefact types emerge must be explored simultaneously with the past contingencies and processes of living that these were related to (Fowler 2017:105).

Treating typologies in such a way can help archaeologists to better understand the assemblages that they themselves operate within and inevitably transform by their involvement.

These assemblages include not only the past remains that are under study, but also the environment and disciplinary history wherein the archaeologists enact knowledge of past societies (cf. Hicks 2010). This can then address a key issue created by standardised, normalised typologies:

“We cannot simply define a set of taxonomic qualities—shape, size, material—that these pots have to share, either, as we would quickly find (as with all typologies) that there are many examples that fit in this way, but not that, that match in some ways, but not others (Harris 2017:134).”

The unfolding interpretation of past living conceptualised by relational typology becomes an interplay that accounts for spatial and temporal relations across and within types of materialities. The conceptualisation of typology as relational is pivotal to the Relational Approach employed in the present study. Through its use in the study of lithic assemblages, viewing human and material histories, as well as the established typology (cf. Desrosiers and Sørensen 2016; Sørensen 2012) and terminology of lithic technology (cf. M. L. Inizan, et al. 1999), as emergent and situated will be a means to explore and interpret the *contingencies* from which historical relations were generated, maintained, and fragmented during the Greenlandic Dorset period.

As discussed earlier, a theoretical framework based on assemblage thinking means a conceptual reconfiguration of technological processes, where materials are no longer treated as solely representational of ideological, social, or individual persons. To illustrate this, consider a single piece of flake debitage. Lithic flake debitage are typically regarded as representative of sequences of tool production where the quality and temporality of the production—i.e. knapping technique, method, and number of knapping operations—are in turn considered representative of the internalised knowledge of a technological tradition of an individual person. Here, the physical properties of the material are most often considered in terms of raw material provenance, signifying a more-or-less specific area of procurement, or of raw material quality that allows or disallows ‘ideal’ sequences of production to be made. Furthermore, the physical attributes of the object are viewed through the lens of ‘technological process’, where observable qualities represent the effects that knapping techniques have in relation to the fracturing properties of lithic raw material.

These inferences are indeed relational. For example, a minute, small platform together with a small lip and bulb formation at the ventral proximal surface on a lithic removal represents the effects of knapping by pressure-flaking. A larger platform with a more pronounced bulb formation, on the other hand, implies the use of direct or indirect percussion. Such inferences help archaeologists to infer the ‘life history’ of objects as the operational chain of actions that produced its observable attributes and/or design. Where the *chaîne opératoire* has been invoked in Greenlandic archaeology, these material histories of artefacts have generally been related to which degree a knapper successfully followed an ideal mental template of how production should be executed (Jensen 2006b; Sørensen 2012). This presupposes a separation between mind and matter,

Raw material

Figure 3: The *chaîne opératoire* of bifacial components from the Greenlandic Dorset (Sørensen 2012:224).

Raw material

Figure 4: The chaîne opératoire of microblade components from the Greenlandic Dorset (Sørensen 2012:225).

where choices made in production, use, and discard are determined by a traditional, ideological structure that is possessed by all individuals and defines cultural units.

Working from this Mind-on-Matter presupposition, the use of the *chaîne opératoire* has become a tool for prescriptive identification rather than descriptive explanations. Consequentially, the spatial and temporal transmission of knowledge and skill (i.e. learning) as represented by materials is presupposed as passive, effectively pacifying people and materialities within ‘highly conservative’ social traditions (Sørensen 2012:343). Technological similarities between various regions are thereby removed from the situated and dynamic historical processes that led to the deposition of materials. As discussed earlier, this has resulted in the reification of culture-historical and eco-functionalistic explanations in Greenlandic archaeology that relies on external causes such as diffusion, migration, or environmental stress. Change is here bound to a linear understanding of time following the chronology of culture-history, where causalities for change are bound to culture-historical events such as migrations of people in response to changing environments.

Recent discussions on the use of the *chaîne opératoire* have presented an opportunity to re-configure this understanding of change in materials and technologies over time by emphasising the *situated emergence* of the technological process. Instead of considering the development of material and technological change to be oriented around ‘ideal’ social practice, this development is understood as a generative process involving a ‘developmental ecology’ (Ingold 2011; Walls 2016), where technological process is bound to the relations of and among people, materials, and the environment. Technological patterns are thus no longer constituted solely by knowledge and know-how of ideal practice, but co-created by materials and other non-human entities in the environment (Walls 2016:22, 26).

Through ethnoarchaeological study of Inuit kayak-making in West Greenland, Matthew Walls (2016) has provided a useful analogy for how technological production is constituted by a developmental ecology. Here, the importance of *environmentally situated practice* is demonstrated, where the production of functional kayaks is not defined by passive transmission of ideal knowledge from a skilled practitioner to a novice, but rather as *co-construction*. In this case, novices and skilled practitioners alike are guided by intimate knowledge of the heterogeneous physicality of materials assembled into a kayak and how these relate to use of kayaks themselves—knowledge that necessitates individual attunement and experience in how kayaks are operated and function in different scenarios and changing environments: Becoming a skilled kayak-builder also allows the developments of capacities to become a skilled hunter, capacities that would be impossible to develop if individual learners were not situated in an ecology—or ‘assemblage’—of human and non-human relations (Walls 2016:29). The use of the *chaîne opératoire* is vital here for identifying the various operational sequences involved in the process of kayak-making. However, rather than juxtaposing observed operational sequences to an ideal template of production and design, the materials involved in the process were viewed as taking part in constituting the Inuit kayak-makers and their relationship with their social and material environments (Walls 2016:24).

Integrating the *chaîne opératoire* within a conceptual framework that highlights the historical and environmental situatedness of practice implies an acknowledgement of multiple scales of history through which practices emerge. This perspective on time and scale is integral to assemblage thinking:

“Historical narratives cease to be constituted by a single temporal flow – the short timescale at which personal agency operates or the longer timescales at which social structure changes – and becomes a multiplicity of flows, each of its own variable rate of change, its own acceleration and decelerations. (DeLanda 2016:14).”

Hamilakis and Jones explain this as a *non-linear* and *non-chronometric* way of explaining change over time. Here, time foregrounds multiple temporalities and co-existence rather than monochrony and linear succession. Relations between entities encapsulate past relations while simultaneously promoting and at times demanding future relations (2017:82). For the life histories of materialities, their respective pace of change can therefore be decided by their relations with other materials as much as by their production and maintenance by humans (Hicks 2010:88).

In a discussion on the conceptualisation of scale in archaeology, Harris critiques the conventional treatment of scale as having been made in terms of the absolute, effectively placing “the structure of history outside the processes that produce it, making the differing scales transcendent and eternal, rather than immanent to the activities that form them (2017:128)”. Placing actors and processes on a levelled playing field—a ‘flat ontology’—means that no aspect of reality is considered to be more important than others. No scale is given primacy. Rather, scale is considered relative. The identity of an assemblage both constitutes and is constituted by its relation to other assemblages that change over time and scale. An archaeological assemblage does not exclusively refer to a single, immediate space and time that it occupies and once occupied, but instead to multiple spaces and times wherein it operated prior to its deposition and eventual collection (Vale 2017:28).

The deposition, excavation, and curation of collections have aggregated and mixed objects through a multitude of different histories and movements. This has important implications for how the lithic assemblages included in the present study—each with a history of being curated museum collections—are involved:

“Indeed, museum collections are often perceived as the very antithesis of archaeological assemblages—out of context, shuffled together in convoluted and confusing ways, and with much accompanying dissolution of “authentic” contextual archaeological information” (Harrison, et al. 2013:19).

This requires the recognition that the interaction between the researcher and curated materialities of the human past is an *enactment* of knowledge. By thinking of depositions as assemblages, the

excavated and curated remains of lithic technology from the Greenlandic Dorset are assemblages at different scales, where even individual objects might partake in creating histories that in turn affect other assemblages of relations (Vale 2017:37).

Framing the analysis of collected and curated archaeological deposits using assemblage theory presents the opportunity to explore how materialities participated in shaping the lifeways of past people. Thus, the prehistoric tool kit assemblage and the present lithic assemblage took and takes part in constituting their own historical contexts. The history of deposition for a lithic object and a lithic assemblage is connected to the preceding histories of the lithic objects that influenced raw material procurement, tool production, maintenance, and fragmentation. As is demonstrated in the regional case-studies, these histories may include the effects of material properties, the technical proficiency of the knapper, and relations between lithic components and composite tool designs.

It is in this way that the relational approach of the present study allows inferences of the histories of human-material relations through relative rather than absolute scales. Each object in the site assemblage emerged from historically unique events created from assemblages of contingent relations between humans, lithics, tool components, and the broader tool kit repertoire (see part 2.2.1.). This applies at any scale, be it the physical attributes of individual objects, the typological composition of objects deposited at specific sites, or the assemblage of objects collected and curated in a museum storage. As such, any perception of intentionality—prior to and during site deposition, collection, and curation—is not regarded here as representative of strictly embodied agency, but rather enacted, emerging, situated agency (Harris 2017:131).

If the history of a lithic assemblage is regarded as *representing* agency, then we are subscribing to a perspective where agency is an essence to be possessed by actors, either by humans exclusively or by humans and non-humans alike. It is the emergent relations between humans and materialities that is the focus of my study, bundled up in assemblages—including not only materialities, but also norms, habits, thoughts, gestures, etc. (Hamilakis and Jones 2017:82; Harris 2017:129) that are spatially and historically contingent. As such, intentionality is here regarded as being shaped by past and present relations that in turn creates future relations.

2.4. A Relational Approach to Greenlandic Dorset tool kit curation

Methodologically, the present approach builds on recent developments in *chaîne opératoire* research on Paleo-Inuit lithic technologies in Greenland (Grønnow 2017; Jensen and Grønnow 2017). These studies have taken research further by placing emphasis on lithic technologies of Paleo-Inuit cultures as part of composite tool technologies. This is clearly expressed in the ‘tool kit approach’ designed by Grønnow (2017). It demonstrates the potential of the *chaîne opératoire* to describe the material relations between components of composite tools, which in turn can yield more detailed taxonomies of tool kit technologies. With its use, Grønnow has constructed a new taxonomy of the Saqqaq stone-using tool kit – partly achieved thanks to the well-preserved remains of composite tools, but more crucially by inferences of composite tool designs based on the metric and morphological properties of lithic components (Grønnow 2017:46). It is thus demonstrated that people produced repertoires of similar tool types with different sizes and designs for different functional purposes, and not necessarily through linear steps of production. Furthermore, it places deeper emphasis on the life histories of objects *after* their production, demonstrating the variability of forms that specific lithic types might attain as a result of different temporalities. This way, the tool kit approach highlights how lithic technologies did not exist separately from composite tool technologies.

In this sense, the tool kit approach showcases the potential of activating a relational perspective through the use of the *chaîne opératoire* methodology. However, the main issue with the approach is that it maintains an interpretative framework that divides the social and material world, whereby the production and maintenance of prehistoric technologies still defers to mental templates. The relational *description* of the Saqqaq tool kit essentially provides a more detailed ‘strata’ of cultural tradition to be chronologically sequenced by site stratigraphy and absolute datings (Grønnow 2017:44). Despite how detailed these cultural traditions are described, the narrative of historical development remains locked at the scale of culture-history. However, the tool kit approach strongly suggests the potential for *explaining* the contingent relations between different materialities co-created. The Relational Approach activates this explanatory potential using Assemblage Theory.

To illustrate this, Grønnow’s description of Saqqaq burins offers a useful example. While the distal area of individual burins would often be re-sharpened and altered in size through the history of the composite tool, the proximal area would remain stable due to its attachment to the haft

(Grønnow 2017:46, 276-278). In terms of Assemblage Theory, the haft would territorialise the hafting area of the burin over time, while the exposure of the ‘working’ area to use and component rejuvenation by people would more frequently de-territorialise its shape and size. We can thus recognise lithic burins as assemblages that were part of composite tool assemblages, and that their different parts would change at different paces of time depending on how the object related with people, other materialities, and the environment. Therefore, by upgrading the interpretative framework of the *chaîne opératoire* methodology with concepts of Assemblage Theory, the Relational Approach can interpret the temporalities of lithic technologies as embedded in and interplaying with the temporalities of composite tool technologies. In other words, it can interpret contingent histories of tool kit curation.

Much like the lithic remains from the Saqqaq period, the lithic remains from the Greenlandic Dorset period were either part of composite tools or associated with their production and maintenance. The Relational Approach considers the deposition of these lithic remains as not only representations of technological tradition, but as the effects of historically contingent responses people made to the affordances of various lithic materialities, as well as to traditional knowledge and the environment. Through examination of lithic assemblages, this recognition makes it possible to infer how lithic materialities and their relations demanded and/or promoted specific human responses. This builds interpretations of how people became situated both similarly and differently over time and between regions; interpretations where the emergence of regional lifeways was contingent on the dynamic relations between people, lithics, and composite tool technologies that were enacted during tool kit curation.

2.5. Operationalising the Relational Approach for technological study of lithic assemblages

In this study of lithic assemblages from the Greenlandic Dorset period, the analyses will primarily be made through techno-typological examination using the method of technological classification. As such, objects will be categorised according to macroscopically observable morphological, metric, and otherwise typological characteristics that can be attributed to differences in tool designs, raw material type and quality, as well as stages of production, maintenance, and deposition. The technological classification will here be based in the well-developed terminology for describing the attributes and characteristics of knapped stone (see e.g. M.-L. Inizan, et al. 1999;

Pelegrin 2012; Sørensen 2006), along with the current taxonomies of Paleo-Inuit lithic technology (Desrosiers and Sørensen 2016). Supplementing the technological classification are numerous illustrations and drawings of individual lithic artefacts. The drawings here serve to maximise the level of detail during the analysis, highlighting subtle yet important attributes. The artefact illustrations—both photographs and drawings—can be found in appendices D, E, and F where they are sorted by their respective lithic assemblages.

My analyses will also involve the methods of refitting and Minimal Analytical Nodule Analysis (MANA). The benefit of their complementary use with technological classification has been demonstrated in numerous lithic *chaîne opératoire* analyses of late (e.g. Desrosiers and Sørensen 2012; Mansrud and Eymundsson 2016; Sørensen 2012; Sørensen, et al. 2013). Employing these methods in conjunction significantly amplifies the possibility for identifying sequences of production and the relations between multiple artefacts in the lithic assemblage(s) (Miller 2016). Here, this potential is expanded even further within the framework of a Relational Approach, by promoting multi-scalar inferences to be drawn from the analyses; from individual object life-histories, to the inter-regional formation of assemblages.

Whereas technological classification puts the variability in artefact types and their attributes in clearer view, the additional use of refitting opens the possibility to demonstrate explicit links between separate artefacts during analysis. Refitting is a popular method in lithic analysis, often used for providing detailed patterns of how sequences of lithic production were spatially organised (Cziesla 1990; Nielsen 2017; Skar and Coulson 1986). In the present Relational Approach, however, the method is used complementary to better define the temporalities that formed the lithic assemblage. This will bring out more detailed temporal patterns that can explicate events of human-lithic interaction prior to the deposition of the lithic artefacts.

Furthermore, successful refits are not required to utilize the potential of the method. When used in conjunction with technological classification, attempts at refitting can elucidate whether there are direct relations between different artefacts in the assemblage. Formalised as '*mental refitting*' (Pelegrin 2006:39), this form of macroscopic analysis can indicate sequences of operations involved in their production and maintenance as well as the events resulting in their deposition (e.g. fragmentation)—even in the absence of associated objects. Separate and intertwining temporalities of objects can thus be inferred at various scales, and so it becomes

possible to interpret how objects and their preceding relations influenced the formation of a lithic assemblage.

To maximise the output and minimise the time expenditure of my lithic analyses, the Minimum Analytical Nodule Analysis is a useful complementary tool. (e.g. Larson and Ingbar 1992; Larson and Kornfield 1997; Soressi and Geneste 2011). Operationalising MANA entails identifying groups of lithic objects that have been knapped or fragmented from an individual nodule, core, or tool implements (Miller 2016:1). As my technological classification will account for lithic raw material variability, MANA becomes a default component to my analysis. MANA is most easily used when lithic assemblages are composed of a variety of distinguishable raw material types. The distinct diversity of lithic raw materials in Greenland therefore provides favourable conditions for its application. However, arbitrary distinctions between raw material types must still be accounted for, making the auxiliary use of refitting important.

The assemblage analyses will first and foremost be presented at the scale of *site assemblage*, i.e. the empirically available objects collected and assembled from a specific site. Using technological classification, each site assemblage is sorted into its different lithic types, referring to formal lithic tool types and their standardised *chaîne opératoire* known from the Greenlandic Dorset (Figure 3 and 4). The diversity of characteristics within each of these formal types are in turn sub-divided into a variety of different assemblages depending on their inferred position in sequences of production and maintenance, as well as their raw material type. This sub-division will refer to present knowledge of the technological process of lithic tool production and design, as well as the variety of lithic raw material types known to Greenland (cfr. Sørensen 2012). For further descriptive details of each examined assemblage, the reader can refer to the appendices A, B, and C—each assigned to a respective case-study.

The empirically observable characteristics of each object may not always be neatly associable with formalised sequences of production and use. It is therefore crucial to explore relations beyond the scale of assemblages being described (e.g. the individual object, type, or site assemblage), as each element of the assemblage refers to other, potentially different, assemblages. Arguably, this will not serve to promote standardisation and universalisation of categories, but that is not the objective of the study either. The approach can instead be described as a *dis-assembling/re-assembling*’ (cf. Byrne, et al. 2011:21; Hamilakis and Jones 2017:82) of Greenlandic Dorset archaeology, predicated on lithic analyses from three regions—each with its

unique environment and research history. Each of the three regions included in this study is presented with an overview of research history and current understanding of the regional Greenlandic Dorset period, as well as available geographical and environmental information. This provides a baseline for inferring the historically and environmentally situated relations in which lithic materialities were actively involved. From the bottom-up, these inferences will define new regional interpretations on the relational dynamics of Greenlandic Dorset lifeways, which in turn will be drawn from in the final synthesis.

2.6. Conclusion

The Mind-on-Matter principle of the *chaîne opératoire* methodology has perpetuated conceptual issues regarding how we describe and explain the dynamics of Greenlandic Dorset lifeways through the study of lithic materials. Unlike previous technological studies of Greenlandic Dorset lithic assemblages, the Relational Approach utilises the *chaîne opératoire* methodology specifically to examine lithic remains as *more-than-representative*. This makes it possible to describe and explain historically significant relations between people, lithics, and other non-human beings in the environment. As such, lifeways are viewed as emerging from assemblages of relations that were defined by more than culture, historically situating people differently in various Greenlandic landscapes.

In the three proceeding chapters, the dynamics of Greenlandic Dorset lifeways will be interpreted through an empirical investigation of available lithic assemblages from three regions of Greenland. The regional case-studies thereby disassembles the current perspective on the Greenlandic Dorset as a highly conservative technological tradition, to re-assemble relational perspectives on Greenlandic Dorset lifeways as regionally diverse and highly dynamic.

Chapter 3 - Dwelling in an Arctic Oasis – The Greenlandic Dorset of Qeqertarsuup Tunua

In this chapter I will employ the Relational Approach to examine lithic assemblages from Qeqertarsuup Tunua (Disko Bay), focusing on three of the most well-studied sites in the history of Greenlandic Dorset archaeology. Lithic assemblages from this region have been crucial to the standardised typological and technological taxonomy that defines the Greenlandic Dorset as highly conservative technological tradition. Regionally, they have also informed interpretations of a regionalisation of the Greenlandic Dorset tradition in one of the most environmentally favourable areas of Greenland. This scholarship holds a key position in how we infer and understand the histories and dynamics of living for people during the period. Through bottom-up technological analysis framed by the Relational Approach, the first case-study of this thesis examines these dynamics in deeper detail. With a focus on historically contingent human-material relations, the analyses presented here provides a more nuanced perspective on the deeper dynamics of Greenlandic Dorset lifeways. This relational perspective recognises how human-lithic interactions—contingent on the demands of lithic and tool kit materialities—afforded specific ways of tool kit preparation and maintenance. In turn, this structured regionally and historically unique assemblages of relations. Despite the favourable environmental conditions of Qeqertarsuup Tunua, these relations formed a propensity among groups towards transient social commitments to specific locations in its landscape, which counteracted an increased regionalisation over time.

Figure 5: Qeqertarsuup Tunua (Disko Bay). Map by Edwin Bolhuis.

This chapter presents technological analyses of three lithic assemblages from Qeqertarsuup Tunua (Disko Bay). This first case-study pilots my thesis, demonstrating how the Assemblages Approach outlined in the previous chapter can provide an alternative perspective on the Greenlandic Dorset period. The lithic assemblages included in this chapter are from the small camp site of Innartalik I, and the larger base camp sites of Umiartorfik, and Annertusuaqqap Nuua. The sites are among the most well-defined in the archaeological record of the Greenlandic Dorset. The assemblages therefore offer important opportunities to gain insight into human-material relations during the period.

The first part of this chapter introduces the regional geography, climate, and resource base of Qeqertarsuup Tunua, followed by a review of the current knowledge of the culture-history and hunter-gatherer living during the Greenlandic Dorset in the region. This is followed by a regional history of research. To conclude the first part, a general overview of taphonomies crucial to the current state of Greenlandic Dorset archaeology in the area is offered.

The main part of the chapter presents results from the lithic analysis of three selected assemblages from the region. Each lithic assemblage is presented according to established typological and technological categories of Greenlandic Dorset lithic technology (cfr. Desrosiers and Sørensen 2016; Jensen 2016; Sørensen 2012). In the third and final part of the chapter, the analyses of the site assemblages will be summarised and discussed.

3.1. Regional geography, topography, and environment

Qeqertarsuup Tunua (Disko Bay) forms a distinct climatic and topographical zone in the northern part of Central West Greenland, between 68° and 70° latitude. The bay is delimited by Qeqertarsuaq (Disko Island) to the west, the Greenland Ice Sheet to the east, the Nuussuaq Peninsula to the north, and the Southwestern Archipelago and Sydostbugten (Southeastern Bay) to the south. Defining topographies vary from the high-altitude, ice-covered tablelands of Nuussuaq, the ice-covered plateau of Qeqertarsuaq, and undulating hills of the islets, skerries and narrow sounds that forms both the Southwestern Archipelago and Sydostbugten. These topographies—together with the proximity to the Greenland Ice sheet and the warm West Greenland Current coming in from the Baffin Bay—creates a Sub-Arctic climate gradient that varies between an Arctic oceanic climate zone along the coast to a typically Sub-Arctic continental climate zone in

the eastern hinterlands. Present-day annual temperatures average at around -4.9°C , with annual precipitation of $\sim 240\text{ mm}$ (Jensen 2006b:19).

Climatically, Qeqertarsuup is distinctly positioned at the border between the High Arctic and the Sub-Arctic. Because Qeqertarsuup straddles two distinct climate zones, the environment has supported a highly productive resource base for human populations throughout history and prehistory (Jensen 2006b:19). The bay also has a history of substantial seasonal variations resulting from solar minima and maxima throughout the year. This variability is further conditioned by

the West Greenland Current, channelled into the bay from the south and deflected north and westwards, creating a counter-clockwise flow through the bay. These conditions are crucial for the formation and melting of sea-ice within the bay which in turn, the changing ice-cover determines the annual variability and quantity of game animals. Due to the direction of its deep channel currents, the southern part of the bay provides ideal conditions for polynya formations (Jensen 2006b:17-19)

The seminal zooarchaeological study by Meldgaard (2004) of animal resources in Sydostbugten provides a baseline for the current understanding of game availability throughout Qeqertarsuup Tunua. Meldgaard identifies four seasonal resource situations in Qeqertarsuup Tunua

- 1) A spring boom with an extreme abundance and concentration of species such as white whales, capelin, seals (harp and ringed) and nesting birds and their eggs. The primary conditions for this situation are the social behaviour of the species, and partially due to the melting sea ice with emerging ice edges and leas;
- 2) The summer situation is characterised by a general abundance of resources, with large whales and fish most common. Char runs represent the most concentrated resource, while other resources are more dispersed than during spring. Seals are now fewer, whereas berries and caribou become important terrestrial resources;
- 3) Migratory species become

Figure 6: Annual resource variability in Qeqertarsuup Tunua during Historical Times. Sketch map by Jensen (2006b:21), based on (Meldgaard 2004).

a vital resource in fall. These species include white whales, harp seals, and waterfowl. A slight increase in resource abundance is seen, although more dispersed than during summer; 4) The resource base is at its minimal during the winter, with ringed seal being the only available resource.

Seasonal variations in the resource base of Sydostbugten makes it possible to divide the area into seasonally defined ‘resource-zones’: a spring outer-island zone; a summer inner bay zone; a summer/fall inner-fjord and interior zone; and a fall/winter bay zone. These distinctions give an idea of the considerable potential for environmental variation in Qeqertarsuup Tunua.

Other important environmental factors are the inter-annual and long-term fluctuation of species population dynamics. The most important being micro-shifts in climatic conditions observed in seasonal temperature and wind patterns, which are both crucial for annual processes such as ice-formation and melting, as well as animal social behaviour (Meldgaard 2004:34-35). Few species are exempted from such fluctuations. Among the most notable variations are observed in the population dynamics of species such as caribou, harp seals, and ringed seals—game species that would have been significant to people’s subsistence during the Greenlandic Dorset.

Historical and modern records from the past 250 years indicate several pronounced fluctuations of caribou populations in West Greenland (Meldgaard 2004:145-146) These fluctuations represent sudden, rapid shifts in regional populations sizes. A recent, significant fluctuation in West Greenland occurred during the 1960s when the majority of the local population of caribou on the Nuussuaq Peninsula became extinct (Meldgaard 1986). Although these historical fluctuations may or may not be directly analogous to the Greenlandic Dorset period, they reveal how sensitive caribou populations can be to sudden changes in their immediate environment (see also Cuyler 2007:225)

The position of Qeqertarsuup Tunua on the shifting climatic border between the high arctic zone and sub-arctic zone is essential to the fluctuations of sea mammal species. As a result of this, changes in populations of arctic and boreal species such as ringed seal and harp seal happens concurrently, where the decline of either involves the increase of the other (Meldgaard 2004:34).

3.1.1. *The lithic raw materials of Qeqertarsuup Tunua*

The geology of Qeqertarsuup Tunua has been shaped by typical formation processes that are generally observed to have occurred throughout Greenland’s geologic history; volcanic, sedimentary, and metamorphic (Sørensen 2012:46-49). The eastern, interior areas of the bay

adjacent to the Greenland Ice Sheet are dominated by Precambrian gneiss formations. These areas are characterised by low relief plateaus bisected by troughs oriented east-west or northeast-southwest, as well as the undulating ice-scoured hills on the islets and skerries of the Southwestern Archipelago. Cretaceous and Tertiary formations are primary to Western Nuussuaq, Qeqertarsuaq (Disko Island), and on the island of Kitsissunnguit (Grønne Ejland) northwest of Sydostbugten. The geological formations in these areas are characterised by the glacier-covered basaltic plateaus fringed by rock glaciers, scree slopes and alluvial fans sloping down to sea-level. This environment starkly contrasts the relatively hospitable coastline of the eastern and southern parts of Qeqertarsuup Tunua, providing only limited space for human settlement. On the other hand, it is from these areas that Paleo-Inuit groups sourced essential lithic raw materials such as *killiaq* and microcrystalline quartz, which occurs in generally localised areas within the Cretaceous province. A summary is provided of lithic raw material known to have been utilised by Dorset people in the region in the following sections. These descriptions draw heavily on studies made by Jensen (2006b), Sørensen (2012), and Jensen and Petersen (1998).

Microcrystalline Quartz

Microcrystalline quartz (MCQ), otherwise referred to in literature as chalcedony (Jensen 2006b; Jensen and Petersen 1998) or *ammaaq* (Meldgaard 1996), is the lithic raw material most frequently observed in Greenlandic Dorset assemblages from Qeqertarsuup Tunua. MCQ is a lithic material characterised by a microcrystalline structure consisting of siliciumoxide (SiO_2) as result of several formation processes. A common precondition for such formations is the combination of younger sedimentary rocks/layers and older remains of volcanic activity, i.e. basalt. One such process is the slow dissolving of silicium from sedimentary rocks, subsequently transported, deposited, and crystallized in large cavities of basalt layers, creating flat, tabular nodules. Another process is the occurrence of MCQ between two layers of basalt, where a silicium-rich layer has been formed over an older basalt layer, itself covered by a second basalt layer from younger volcanic activity. The high temperature caused by the volcanic activity transforms sediments into extensive and thick layers of tabular MCQ nodules. These nodules occur in a variety of sizes, shapes, quality, translucency, and colours. Lithic artefacts of MCQ in Greenlandic Dorset assemblages from Qeqertarsuup Tunua features a considerable variety of colours, with blue-white being most common.

The occurrence of MCQ in the landscape is primarily as nodules released from the bedrock due to frost and erosion. So far, surveys have not been able to identify any distinct outcrops of MCQ in the Cretaceous province of Nuussuaq and Qeqertarsuaq. This has significant importance to the present understanding of how Dorset groups organised the procurement of lithic raw material. Archaeological surveys in the region have hitherto been primarily oriented along the coast (Jensen 2006b:37, 43)—leaving most of the interior valleys archaeologically uncharted. Another important factor is the dramatic and destructive effects caused by landslides and solifluction. These effects are far more common in the Cretaceous province than elsewhere in the region due to its steep, alpine topography. The unfortunate consequence of such catastrophic effects are the complete obliteration of areas where raw material outcrops and archaeological sites may have been present (Jensen 2006b:30-31), while also providing challenging conditions for surveying.

Killiaq

Killiaq refers to a specific group of lithic material of metamorphosed slate. The name defers to the Greenlandic word for ‘a hard grey stone that in ancient times was used for making tools’ (Meldgaard 1996:14-16). This type of lithic material is formed by the transformative (metamorphic) effects of local, volcanic intrusions into sedimentary layers of slate. Due to the nature of its formation process, the occurrence of *killiaq* is often highly localised. Sources of *killiaq* have become exposed from the effects of natural erosion, such as frost or river erosion. During these processes, nodules of *killiaq* can also be transported away from its source area and eventually become deposited along riverbeds. Furthermore, beach-rolled nodules of *killiaq* can be found in areas where sources have become exposed by coastal erosion.

Several variations of *killiaq* have been distinguished in Qeqertarsuaq Tunua. These variations are generally identified by granular density and colour. The dominant type of *killiaq* identified in Greenlandic Dorset assemblages is a hard, grey-coloured type with generally good fracturing properties. This type of *killiaq* is associated with outcrops found on the Nuussuaq Peninsula. Geological and archaeological surveys have identified three outcrops of *killiaq* on the northern shore of the peninsula, near the present Qaarsut-settlement: Slibestensfjeldet, Østerfjeld, and by an abandoned coal mine local to the settlement (Jensen 2006b:86-87; Sørensen 2012:54-55). The raw material variation within and among these outcrops are predominantly of colour nuances and patterns, although some varying degree of granular density has also been identified.

From the outcrop of Østerfjeld, dissected and exposed by the Qaarsut Kussinersua river, *killiaq* is available as tablet shaped nodules from the bedrock or as rounded, water-rolled, nodules from the river. Variations in colour range from dark grey, bluish, grey with blue spots, and a finely layered grey and blue type. The outcrop from Slibestensfjeldet feature similar types of *killiaq* except spotted but including a red-toned grey type. Nodules are here typically tablet shaped, and specimens up to 10 kg in weight have been identified.

Qaarsut is by far the largest lithic extraction area known to date in Greenland. Scattered across the nearby shore and several kilometres into the hinterlands along the Qaarsut Kussinersua river, numerous knapping sites have been identified. Material remains at the sites indicate a systematic procurement of *killiaq* raw material. Here, Paleo-Inuit groups collected nodules of *killiaq* from the riverbed of the interior and subsequently tested and shaped the nodules in the immediate area. Lithic remains from the coastline indicate that suitable nodules would have been transported to the coast to be further shaped into tool blanks and preforms. Studies of Paleo-Inuit raw material use and lithic technology in Disko Bay attributes this system of procurement to the Saqqaq period (e.g. Jensen 2006b; Sørensen 2012). The material record from Saqqaq assemblages strongly suggests that a key component of its regional lithic production was a highly itinerant organisation of procurement and preparation of *killiaq* preforms in a ‘down-the-line’ system with the outcrops of Nuussuaq as its basis. Definitive Dorset assemblages have yet to be identified in the area, thus inhibiting evidence-based inferences regarding if and how Dorset groups utilised the available lithic resources.

Another distinct variant of *killiaq* is the Angissat-type, referring to the Angissat Site from which the material has been sourced. The site is located on the island of Kitsissunnguit (Grønne Ejland) and features a cliffside with an exposed *killiaq* outcrop facing the shoreline. Here, raw material can be extracted directly from the cliffside or gathered as boulders lying scattered along the shoreline. The limited remains of primary knapping activities near the site suggests that the extraction of Angissat-*killiaq* only occurred on a small scale. This interpretation is corroborated by the relatively limited frequency and distribution of the raw material in Paleo-Inuit assemblages from western Greenland (Jensen 2006b:87-88).

Quartz crystal (rock crystal)

While not as frequent as MCQ and *killiaq*, lithic artefacts of quartz crystal constitute a distinct component of Greenlandic Dorset lithic assemblages. Also referred to as rock crystal, quartz crystal is a fine-grained and glass-like material that is often found in a highly pure quality. The formation of quartz crystals occurs during processes of volcanic activity, when pegmatite rock—rocks composed of crystals of at least 1 cm in diameter—are formed in pockets within magma. Rock crystals are thus typically found in geological provinces formed by volcanic activity, including areas with gneiss and granite. The crystals can be found in relatively large quantities in fissures and cavities referred to as ‘crystal cellars’. Quartz crystal variations found in Qeqertarsuup Tunua include transparent, smoky coloured, and opaque-white material. Surveys on the Nuussuaq Peninsula have identified several small sites where relatively large crystals are found, occasionally together with MCQ. However, quartz crystal can also be found in the Precambrian gneiss province. The occurrence of quartz crystals in Greenlandic Dorset assemblages are generally related to the use and production of microblade technology, although a few possible exceptions have been identified in the present study.

Quartzite

Quartzite is formed when quartz grains in sedimentary rock becomes exposed to extreme pressure or heat. However, due to contaminating minerals, quartzite becomes coarse-grained and harder than microcrystalline quartz. Variations in quartzite coarseness occur. No regional sources of quartzite from Qeqertarsuup Tunua have been identified. The Nuuk area is the part of West Greenland typically associated with the natural occurrence of quartzite (Sørensen 2012:59). A few quartzite artefacts have been identified in assemblages from the region, suggesting long-distance transport of material.

3.2. The history of research on the Dorset of Qeqertarsuup Tunua

The archaeology on the Dorset in West Greenland has had substantial implication on the emergence of the Greenlandic Dorset as well as the wider Early Dorset period of the eastern Arctic. Even so, the spatial and temporal extent of the people’s presence during the Greenlandic Dorset of the region remains ambiguous. Its archaeological record includes reports and documentations from numerous surveys, but only a handful of excavated material collections and detailed analyses. Extant

collections of artefacts collected from the surface of sites across the landscape during historical times makes up a significant component of the regional record, but these have rarely been a target for published empirical investigation (but see Westmann and Jakobsson 1989).

During their excavation at the seminal site of Sermermiut in 1953, Helge Larsen and Jørgen Meldgaard documented the first stratified sequences of Saqqaq, Dorset and Thule in Greenland (Larsen and Meldgaard 1958). Thus, a Dorset period of human occupation was discovered in Greenland. Before the chronological sequencing by Larsen and Meldgaard, however, the very existence of a Greenlandic prehistory had been debated for over a century (Jensen 2006b:34; Meldgaard 1996:14). As the Dorset became recognised in Greenland, it was now possible for researchers to identify Dorset artefacts in antiquarian collections. The collections by Christian Pfaff are a notable example.

A medical doctor working in Qeqertarsuup Tunua during the 1870s and 1880s, Pfaff was an enthusiastic collector of stone artefacts in the region, especially in its northern parts (Westmann and Jakobsson 1989). His collections remained in personal possession until his retirement, when they were offered to the National Museum of Denmark. However, the museum was by that time no longer interested in accessioning artefact collections from Greenland. Pfaff instead turned to the Museum of Ethnography in Stockholm who accepted his offer. Pfaff's collections would soon after become integral to Ole Solberg's proposal of the existence of a Greenlandic Stone Age (Solberg 1907). His dissertation became a milestone in the research on the culture-history of Greenland, and the existence of a Greenlandic prehistory would be debated for several decades (e.g. Birket-Smith 1929; Larsen and Meldgaard 1958; Mathiassen 1958)

After the prehistory of Greenland was eventually confirmed, Pfaff's antiquarian collection would re-emerge in discussions on the Dorset presence on Greenland. When Meldgaard examined the collection in 1955, he noted that: "It includes Dorset harpoon heads of types found at Sermermiut and a carving with multiple faces in Dorset II style (Meldgaard 1996:13)".

A subsequent hiatus in research on the Dorset in Qeqertarsuup Tunua followed its initial discovery. Substantial additions to its regional archaeological record emerged through considerable survey efforts of the 1980s. These efforts were prompted by changes in heritage management that took place concurrently with the establishment of Greenlandic Home Rule in 1979, followed by the 1981 Greenlandic acquisition of its own legislation for the conservation and preservation of cultural heritage (Andreasen 1986). This resulted in the establishment of local museums that were

provided with sufficient financial incentives by the central government to support archaeological fieldwork (Jensen 2006b:34-35). These fieldwork efforts resulted in some of the most significant discoveries of Greenlandic Dorset sites in the region, especially in the southwestern areas of Qeqertarsuup Tunua.

Initially the survey activity in the region found few indicators of Dorset sites. This was due to a consistent focus on surveying elevations between 4 and 11 m a.s.l, where Saqqaq sites are typically found. In 1988, surveyors eventually discovered Dorset sites on lower elevations between 0 and 4 m a.s.l (e.g. Hansen 1990; Hansen, et al. 1989; Jensen, et al. 1995). A boom of Dorset sites being discovered ensued. This would have a considerable impact on the regional Dorset archaeology—not only because of the increased quantity of identified sites, but also because the largest Greenlandic Dorset sites known to date were identified at these levels.

Of the newly discovered Dorset sites, Ik Karlussuup Timaa would be the first to be excavated in 1993 (Stapert and Johansen 1996), and is among the few large single-component Dorset sites known to date. Perhaps more importantly, it marks a watershed in Greenlandic archaeology by being the first Dorset site excavated with recording methods based on two- or three-dimensional documentation of finds on a grid system (Jensen 2006b:35-36). Another large, well-documented Dorset site, Annertusuaqqap Nuua, was excavated shortly after in 1994 (Jensen 1995). While the site would provide yet another rich assemblage of Dorset archaeological material, its discovery and excavation also highlighted the dire effects of sea-level changes on the low-lying, coastal Dorset sites.

Numerous sites were found to be partially beneath the high-water mark, which had resulted in heavy erosion by the effects of changing tide and relative sea level. Artefact from these sites were therefore frequently found along eroded shorelines. In the present study, the lithic assemblages from Annertusuaqqap Nuua and Umiartorfik are both from original site contexts affected by coastal erosion. As such, the artefact record of these assemblages is variable in terms of contextual detail.

For the prehistoric archaeology of Greenland, the discovery and excavation of Ik Karlussuup Timaa and Annertusuaqqap Nuua prompted a shift in research focus. It was now possible to pose questions directly concerned with the Dorset cultural phenomenon in Greenland. The research that followed was predominantly dedicated to constructing a regional culture-history of Dorset

prehistory in Qeqertarsuup Tunua, based on the spatial organisation of dwelling features and lithic technology, with emphasis on raw material use (Jensen 2006a, b).

This research would in turn have a major impact on the interregional perspective on the Dorset in Greenland, highlighting a need for interregional comparisons of the Greenlandic archaeological record. Eventually, the lithic assemblages from Ikkarlussuup Timaa and Annertusuaqqap Nuua became crucial to the construction of a Dorset culture-history specific for Greenland (Grønnow and Sørensen 2006; Jensen 2006a; Sørensen 2012), becoming ‘type sites’ for the recent definition of the Greenlandic Dorset.

3.3. Current perspectives on the Greenlandic Dorset of Qeqertarsuup Tunua

Combining archaeology with the available knowledge on regional geography, ecology, and geology, it has been possible to make inferences of how humans lived in the region during the Greenlandic Dorset (Jensen 2006b). A central theme here is the seasonality of their hunter-gatherer living. A diversified use of the landscape has been indicated, where Qeqertarsuup Tunua has been divided into a coastal and interior zone of human habitation and activity (Jensen 2006b:168). The coastal, low-lying sites are defined as more permanent winter dwellings, while sites situated towards the interior are usually characterised as ‘temporary’ activity areas. Of the sites included in the present study, Innartalik I represent the latter, while Annertusuaqqap Nuua and Umiartorfik represents the former. On a regional level, faunal site assemblages are generally interpreted as indicative of the ecological niche activity represented by the site, and thus the seasonality of its occupation. However, few sites are distinctly biased towards specific species.

Despite the scarcity of faunal remains, fluctuations in the regional Greenlandic Dorset resource base during the period has been inferred from the record of environmental developments. Regional climatic trends recorded from the Greenlandic Dorset period of Qeqertarsuup Tunua generally corresponds with trends across the Northern Hemisphere. Data such as pollen, macrofossil flora and arthropod remains recorded in peat bogs and turf stratigraphies from the sites Sermermiut and Qeqertasussuk indicates a dramatic cooling trend in the region beginning between 900 to 800 BC. The cooling was only briefly interrupted by a warm and dry spell in the following 800 years. Information on the regional climatic history has also been collected from the marine environment. Studies of diatom flora from seabed cores taken from Qeqertarsuup Tunua (Jensen,

et al. 2003) indicate that the earliest phase of Dorset occupation coincided with a period when the bay was characterised by cool sea and air temperatures as well as extended sea-ice coverage.

The timing of the Greenlandic Dorset onset in the region is consistent with the perception of the Dorset culture as highly adapted to icescapes. Artefacts such as sledge shoes, snow knives, and soapstone vessels that have been found in the western regions of Greenland further substantiates this idea. The general understanding of people at the time being highly adapted to colder climatic conditions can be easily applied to the region (Jensen 2006b:23). The relatively high proportion of faunal remains from species such as ringed seal and walrus accords well with the Greenlandic Dorset as eminent hunters of sea-mammals on and along the edge of frozen seas. The few findings of harpoon-heads made from walrus ivory are important evidence of how this type of hunting occurring within the area. As much as the presence of lithic material can be regarded as representing some degree of terrestrially oriented movement and environmental interaction, so can the presence of terrestrial species in the faunal record. Most prominent are the remains of caribou, particularly from Annertusuaqqap Nuua. Despite the presence of caribou in archaeological assemblages from Qeqertarsuup Tunua, there are currently no empirical evidence related to the hunt for these large game animals. Remains indicative of caribou-hunting during the Greenlandic Dorset are known from further south, in the interior areas of Sisimiut (Grønnow 1986; Grønnow, et al. 1983). We can therefore assume that people at the time were both capable and willing to hunt terrestrially based game animals. The Malmquist site in the interior of Kangerlussuaq Fjord in Sisimiut with its abundance of caribou remains is a testimony to their success in doing so (Bundgaard 1977).

A vital part of our understanding of the regional Greenlandic Dorset is the raw material compositions of available lithic assemblages. The diversity of lithic types reflects the characteristic geology of Qeqertarsuup Tunua. Investigations on the organisation of raw material utilisation has provides valuable insight into one of the vital relationships between the regional Greenlandic Dorset and their surrounding environment. Furthermore, the study of raw material utilisation has in turn become crucial to define the overarching culture-history of the Greenlandic Dorset (Sørensen 2012). By comparison to the lithic technology of the preceding Saqqaq period, with its systematic raw material procurement and lithic production based on a 'core-based' economy of *killiaq* preforms (Grønnow 2017; Jensen 2006b; Sørensen 2012), the relatively low frequency of

preform and remains of primary stages of production in Dorset site assemblages is understood through the concept of ‘embedded procurement’ (Sørensen 2012:311).

Thus, the Greenlandic Dorset economy of raw material procurement was based on the collection of suitable nodules concurrent with other activities, i.e. hunting. In Qeqertarsuup Tunua, the Dorset would mostly favour the use of MCQ for their lithic technologies. Their means of procurement most likely also applied to the acquisition of *killiaq*, as archaeological evidence of Dorset activity near known outcrops remains to be identified. Considering the abundance of both MCQ and *killiaq* in the Cretaceous province, the area would have been an equally vital source of lithic raw material for people during the Greenlandic Dorset as during the preceding Saqqaq period. While the Cretaceous province of Qeqertarsuup Tunua is by no means a small area, it is relatively local within the region when considering the capacity for long-distance raw material procurement observed among prehistoric hunter-gatherer groups across the eastern Arctic (see Rasic 2016).

Another question regarding the regional utilisation of raw material during the period concerns its chronological development in the region. This question has been raised by Jensen’s comparison of raw material composition between the lithic assemblages of Annertusuaqqap Nuua and Umiartorfik—the former representing an early sequence of regional Dorset occupation between 800-400 cal. BC and the latter a younger sequence between ca. 400-200 cal. BC. The relatively high proportion of quartz crystal and locally available Angissat-*killiaq* at Umiartorfik compared to Annertusuaqqap Nuua is argued to indicate a regionalisation of raw material acquisition in the later Greenlandic Dorset period (Jensen 2006b:166-167). Jensen also points to the increased abundance of *killiaq* endblades at Umiartorfik as further indication of regionalisation.

Except for a small proportion of *killiaq* endblades, Dorset groups in the region primarily relied on *killiaq* to produce burin-like tool- and adze components. Most lithic artefacts from the period, however, were made from colourful varieties of MCQ. Technological analyses of Greenlandic Dorset assemblages from the region suggests that tool preforms were made from small tabular nodules, assumed to be the debris of frost splitting and erosion. Another distinct characteristic of Greenlandic Dorset utilisation of MCQ that has recently been discovered is the application of heat-treatment. Experimental research has demonstrated that the technique can considerably increase the fracturing properties of the regionally available MCQ, and that people during the Greenlandic Dorset were well aware of this (Sørensen 2012:310).

Artefacts made from the colourful variations of MCQ indicate a highly economic production and utilisation of lithic components, with an emphasis on microblade, scraper, and biface blade production. This lithic technology is characterised by an emphasis on microblade production from small nodules of MCQ, while scrapers and bifacially knapped components such as endblades and sideblades were usually made from flakes.

Although the lithic technology of the Greenlandic Dorset in Qeqertarsuup Tunua have primarily been interpreted in terms of their spatial and chronological variabilities, their temporal patterns have also been explored combining the concepts of behavioural schemes of production (*schema opératoire*) and production ‘life-cycles’ (Jensen 2006b:169-171). From his analyses, it is made evident that the first stages of production primarily occurred at base camp sites such as Annertusuaqqap Nuua and Umiartorfik occupied at the coast during the winter. The final stages of production, on the other hand, occurred during short summer stays at camp sites such as Innartalik. A distinction is also made between primary production of lithic types and the initial procurement and preparation of their preforms. To Jensen, the partitioning of lithic production across the landscape as well as the distance between southern Qeqertarsuup Tunua and lithic sources in the northern part of the bay suggests that different groups were involved in different stages of production. Enabled by a shared technological tradition, preforms and nodules were exchanged multiple times between their procurement to the north of Qeqertarsuup Tunua and their involvement in production at sites in the southern part. Corollary to these exchanges, different stages in production were made by different groups. It is therefore argued that people in the southern part of Qeqertarsuup Tunua hardly took part in the procurement and initial shaping of preforms (Jensen 2006b).

The current perspectives on human living in Qeqertarsuup Tunua during the Greenlandic Dorset presents two problems that my analyses will aim to solve. The first is the assumption that lithic assemblages were formed during the period by linear sequences of production that strictly followed mental templates. The second problem is the somewhat contradicting perspectives on lithic procurement and circulation presented by Sørensen and Jensen, whereby the former builds on a model of raw material procurement defined by expediency and opportunism, while the latter builds on an idea that people became regionally committed to the landscape and reliant on exchange for raw material access. These two problems present the following question: **Were lithic**

depositions from the Greenlandic Dorset of Qeqertarsuup Tunua formed by linear lithic production seasonally partitioned across its landscape?

3.4. Re-assembling the Greenlandic Dorset of Qeqertarsuup Tunua

This part will present technological analyses of the three selected lithic collections from Qeqertarsuup Tunua. Miscellaneous information and inferences are available in Appendix A. The assemblages are currently curated by the Ethnographic Collection at the National Museum of Denmark in Copenhagen and were analysed during a two-month research here.

The developments of fieldwork methodologies are clearly visible in the archival record of Dorset lithic assemblages from the region. In the earliest excavations of Dorset material by Larsen and Meldgaard, finds were collected according to identified site features. With the surge of archaeological activity in the region following the establishment of the Greenlandic Home Rule, trained academics with backgrounds in Mesolithic archaeology implemented a more developed fieldwork practice, as mentioned in part 3.2. These methods, combined with the relatively well-preserved site contexts endemic to Qeqertarsuup Tunua, has yielded numerous well-documented site assemblages from the region. Individual type artefacts that constitutes the site assemblages in this chapter are all documented individually according to their respective position in a three-dimensional grid system (Jensen 2006b:37). While such a methodology of artefact documentation provides excellent conditions for analyses of spatial organisation, it makes it impossible to reassign an artefact to a different type category without running the risk of reducing the archival integrity of the site assemblage. This means that even if an artefact is reassigned during analysis, the system of documentation ‘forces’ the artefact to be archivally reinstated into the definition to which it was assigned during excavation and cataloguing. This does, of course, help secure the integrity of the assemblage in accordance with its original site context, but with a lack of individual artefact ID’s the original definition of the artefacts becomes preeminent. In turn, such a archival context creates an entrenchment of artefact definitions (see Dibble, et al. 2009).

3.4.1. *Annertusuaqqap Nuua*

Annertusuaqqap Nuua was discovered during an extensive survey in 1988. The site is located on an isthmus near the tip of an east-west oriented peninsula stretching approximately 500 meters into Sydostbugten. The site was the first to be defined as a 'low-lying Dorset site' in Western Greenland and features one of the largest inventories of lithics from the Greenlandic Dorset.

Artefacts were initially surface collected, while the remaining material was collected during the excavation in 1994. A total area of 50 m² was excavated at the site, separated into an area A and B. Area A (38 m²) is interpreted as the dwelling area of the site, whereas the much smaller area B (12 m²), located 60 m further to the west and elevated slightly higher, is considered an open-air activity site due to lack of preserved features (Jensen 2006b:133, 147). Major features at area A include a 5 x 2.5-3 m paved platform with two circular/oval flagstone pavements divided by a 2.5 x 0.7 floor area, and a cultural layer. Besides the rich inventory of lithic artefacts several organic artefacts were discovered, including a sledge shoe of whalebone, an almost completely intact harpoon-head, as well as the basal fragment of a similar harpoon-head (Jensen 2006b:139). In sum, the archaeological record of Annertusuaqqap Nuua is considered the result of relatively long-term occupation by Dorset people, presumably during winter seasons (Jensen 2006b:164).

Two AMS datings are available from the site, one from a sample of charcoal, another from a bone of caribou. The deviation between the datings only allow for a broadly estimated dating of 750-400 cal. BC, well within the calibration plateau (Jensen 2006b:143, 145).

The limited faunal remains found at Annertusuaqqap Nuua provides evidence of winter occupation, with the presence of polar bear and ringed seal. However, a relatively large proportion of caribou remains is also present, interpreted as the result of autumn occupations and the proximity to nearby caribou hunting grounds.

Figure 7: Artistic rendering of Annertusuaqqap Nuua. Watercolour by Martin Antoni Nielsen (Jensen 2006b:152).

Parts of the cultural layer at area A have been lost due to the effects of erosion (Jensen 2006b:131). The large number of findings from the foreshore, which include the remains of a cultural layer, deposits of charcoal, a soapstone fragment, as well as a burnt bone, indicate that the cultural layer would prior to erosion have stretched out onto the present boulder strewn area in front of the excavated site (Jensen 2006b:133).

The largest site assemblage included in this chapter contains a wide variety of lithic artefact type categories, featuring most known types from the Greenlandic Dorset in West Greenland. It also includes artefacts from a variety of stages of production (Jensen 2006b:137).

The lithic assemblage has previously been examined by Jensen (Jensen 2006b) and Sørensen (Sørensen 2012), which have provided extensive information on the technological organisation at the site. These analyses indicate clear patterns of spatial distribution, offering interesting indicators of dwelling organisation. A distinct division between indoor- and outdoor patterns is seen, with the majority of diagnostic debitage found in the dwelling interior, while undiagnostic material is generally found in what is presumed to be a refuse area. More than 90%

of the lithic material was found in this area. Within the dwelling, a distinction between the western and eastern floor sections is visible with almost twice as many artefacts found in the western section. Significant difference is also seen in the interior and exterior distribution of different artefact types and raw material categories.

By measuring the flake/tool ratio for each 0.25 m² across the site, Jensen has demonstrated that the dwelling interior is proportionally dominated by diagnostic material such as tools and microblades with 33% (201 specimens) of all diagnostic material present. Flakes, on the other hand, are represented by a meagre proportion of 6% (542 specimens) of its total amount inside the dwelling. These distributional patterns are indicative of two possible scenarios; that primary stages of lithic reduction generally occurred in the exterior, or that waste material was deliberately dumped outside of the dwelling (Jensen 2006b:141). The proportion of *killiaq* and MCQ is notably different between the exterior and interior. *Killiaq* makes up a 46% of the total collected amount outside of the dwelling, while only 19% inside. Most artefacts produced from *killiaq* have been identified by Jensen as related to the production and rejuvenation of adzes and burin-like tools.

The lithic assemblage includes most of the lithic types from the Greenlandic Dorset period, such as flakes, large flakes/preforms, microblades, microblade cores, endblades, burin-like tools, endscrapers, adzes, sidescrapers, and sideblades (Table 2). Unfortunately, due to time constraints most of the flake material was not included in the analysis. See part 7.1., Appendix A for comprehensive descriptions, and part 10.1., Appendix D for artefact illustrations.

A total of 368 microblades were examined in the analysis (7.1.6.). Only seven of the nineteen inventoried microblade cores were identified during my analysis (7.1.7.). The cause of this discrepancy might be due to microblade cores having been sorted out in previous analyses by their characteristic hinge fractures. The raw material variability among cores is limited compared to among microblades, but the absence of previously inventoried artefacts prevents confident assertions regarding the relationship between the raw material variability of microblade cores and microblades.

However, the large variety of raw material types and sizes among microblades suggests that these were produced from highly curated cores that circulated prior to and after the site occupation. Several refits of microblades from cores of different raw material and size further supports this inference. This suggests that microblade production from specific cores entailed only a few

removals. Considering the large proportion of microblades with retouch (38,8%), it is also strongly indicated that microblades were frequently deposited during component replacements.

Overall, the analysis indicates that microblade production at Annertusuaqqap Nuua afforded significantly to the maintenance of tools that had circulated prior to the site occupation as well as the preparation of component supplies for future maintenance. Additionally, the absence of microblades indicating inexperienced knapping operations suggests that the microblade production was performed and/or supervised by highly skilled knappers (see Milne 2012).

Initially, the 26 endscrapers identified in the site assemblage from Annertusuaqqap Nuua were categorised in accordance with the *schema opératoire* defined by Sørensen. During the analysis, however, the criteria for differentiating specimens into the established phases of production and use were found to be problematic. Among the observed attributes that garnered the

Table 2: Lithic types and raw materials identified in the assemblage from Annertusuaqqap Nuua.

Annertusuaqqap Nuua	Microblades	Microblade cores	Endblades	Sideblades	Endscrapers	Sidescrapers	Burin-like tools	Adzes	Preforms	Flakes (retouch)	Flakes*	SUM
MCQ												
Blue-white	197	3	59	3	10	3			3	6	21	305
Grey	59		7	1	6		1		1	3	1	79
Grey (banded)			1									1
Light grey	24		3		2							29
Dark grey	10		5		3						1	19
Brown-grey	17		7		2				3		8	37
Light brown	2		2									4
Light brown (w/ red incl.)	3											3
Brown			1				1					2
Brown (w/ inclusions)		1										1
Red-brown	9	1	3		2							15
Brown-yellow	19		2									21
Green	3		1	1	1							6
Red	3											3
Red-green	1											1
Red-yellow			2									2
Black-yellow	6											6
Burned	8			1							1	10
n/a			1									1
Killiaq												
Angissat											1	1
Nuussuaq		1	2				50	25		1	7	86
QC												
n/a	7	1										8
Quartzite												
Grey									2			2
SUM	368	7	96	6	26	3	52	25	9	10	40	642

most interest was flared edges, regarded as one of the most distinctive typological traits of Greenlandic Dorset endscrapers. My categorisation of endscrapers based on the presence and absence of flared edges suggests that endscraper design and size does not correlate linearly. While specimens with flared edges are considered finished components in the current standardised taxonomy, their variations in size suggest that the attribute did define all finished endscraper components (7.1.4.). This suggests that tool kits included a repertoire of different scraper tools with various component designs, whereby the shaping of flared edges was contingent on the function of specific scraper tools.

The 94 examined endblades exclusively indicate events of composite tool maintenance, as hardly any of these suggest deposition during production. Only a few specimens indicate rejuvenation of the distal area, suggesting that people preferred replacing redundant components rather than affording effort into curating these. This indicates that people actively maintained a surplus of prepared components. The large amount of previously inventories debitage might suggest that replacement components were produced on site. As such, it can be inferred that endblades were produced at Annertusuaqqap Nuua not only in response to the immediate need for component replacements, but also to stock up tool kit supplies with prepared components that would later serve as replacements.

The amount of cortex among the specimens (average amount ~32,5%) is indicative of raw material procurement where small, tabular nodules/flakes would be selected as endblade preforms. Although this might partly reflect expedient responses to variable access to larger nodules of raw material, it also suggests highly deliberate procurement of preforms that were suitable to the specific component types.

Several large lithic objects of MCQ in the site assemblage were defined as bifacial component preforms. These are highly indicative of on-site bifacial production. Three refitted large flakes of crude quality implicate the regional availability and procurement of lithic raw material during the regional Greenlandic Dorset period (see part 7.1.9., Appendix A). They indicate that people would transport procured lithic raw material over long distances to dwellings sites before testing or preparing these. This might have motivated people to choose nodules similar in size to specific lithic components, sparing themselves the effort of transporting potentially poor-quality raw material.

The variety of bifacially produced lithic components, including adzes (7.1.8.), burin-like tools (7.1.4.), and sidescrapers (7.1.3), indicate a complex variety of events that pertained to lithic production and tool maintenance. Firstly, it is indicated that components were often expediently made from nodules that were procured in the approximate size of the desired components, consequentially limiting the need for extensive knapping sequences. Therefore, individual bifacial components were often produced from individual nodules rather than by several flakes detached from the same core. This contrasts the serially produced microblades. Secondly, hardly any specimens featured traces of component rejuvenation, whereas most specimens indicate that people would rather replace bifacial components before affording efforts into rejuvenation. This might be partially explained by people having to be prudent about producing and keeping supplies of components for composite tools of different sizes and functions.

Summary

The analysis strongly suggests that most components were deposited after being circulated as part of either composite tools or component supplies. Most of the components were deposited during events of tool maintenance through replacement. It is likely that new components were produced on-site, but few were deposited during such events. The presence of failed preforms of poor raw material quality indicate that flakes and nodules would be brought to the site for testing and preparation, instead of being tested and prepared at the lithic source. The indications of primary production at the site and the general provenance of lithic raw materials being restricted to northern Qeqertarsuup Tunua suggests that people transported lithic raw material across considerable distances between the northern and southern part of the bay. Furthermore, numerous specimens suggest that raw material was often chosen in accordance to the size and morphology required by existing composite tools. This in turn would have promoted expedient knapping procedures in accordance to the properties of diverse raw material nodules. People could thus maintain composite tools with less efforts spent into lithic production, while lessening their burdens of transportation.

To best utilise the regionally available MCQ, people used heat-treatment to make efficient use of nodules of a variable sizes and quality. However, this required people to transport untested nodules to the dwelling. The large size of the assemblage and the variability of raw materials might suggest that a single group of people revisited the dwelling on several occasions through several seasons. These were gatherings where people engaged with each other in tool kit preparations and

maintenance, which likely involved the sharing of supplies and raw materials. This prepared people for the coming warm-season dispersals across the landscape and would thus be consequential to people's ability to maintain their tools during long-distance movements.

3.4.2. *Innartalik I*

Excavated in 1995, the site assemblage from Innartalik I is the smallest among the three site assemblages included in this chapter. It is located on Innartalik, the second largest island in the archipelago of Saattut Kangilliit that is situated in the middle of the Saqqarleq Inlet. Innartalik I is made up by the remains of an isolated mid-passage tent ring, within which a relatively small number of lithic artefacts was collected. Based on these findings, the scant remains of camp activity (i.e. charcoal and ash), as well as lack of winter housing in the area from the later Thule period, the site has been characterised as a typical Dorset short-term summer camp. The site is dated on one sample of charcoal from locally grown wood, providing a broadly calibrated date ranging from 770-510 cal. BC.

Clear spatial patterns of technological organisation at Innartalik I has been indicated by Jensen (Jensen 2006b:97-107). A lack of artefacts from early stages of lithic production is notable.

Figure 8: Artistic rendering of Innartalik I. Watercolour by Martin Antoni Nielsen (Jensen 2006b:107).

The undiagnostic waste material is dominated by what has been identified as retouch flakes, indicating that the knapping activity at the site was predominantly in the advanced stages of production. Attempts at refitting indicate that a substantial amount of flakes represent tools that were rejuvenated at site and subsequently transported off-site (Jensen 2006b:97, 102). The number of diagnostic artefacts is proportionally significant compared to any other site included in the study, but it should be noted that 69% of these are made up by fragmented microblades, of which only two fragments of quartz crystal and two fragments of white MCQ have been refitted.

Other successful refits of both undiagnostic and diagnostic artefacts have also been made, providing evidence of at least 12 different sequences of lithic reduction at the site (Jensen 2006:103). The longest sequence of refits is made up by flakes of grey *killiaq*, with dorsal-ventral refits. The remaining refits include two flakes of MCQ, and two fragments of a polished biface of *killiaq*.

The raw material composition the lithic assemblage predominantly includes objects of MCQ, followed by *killiaq* and a relatively large proportion of quartz crystal. The raw material is typically associated with specific component types. At Innartalik, this is most visible in the production of microblades. A clear distinction is here seen in raw material frequency, where blades of MCQ seems to have been brought to the site, while blades of quartz were produced on site. The lithic assemblage from Innartalik generally indicate inter-site circulation, where tools were transported between sites (Jensen 2006b:102).

The variability of raw material at Innartalik I indicate the spatial organisation of activity at the site. The distribution of debitage and microblades of quartz suggest that microblade production of quartz occurred on-site (Jensen 2006b:102). Different tool types and raw materials are associated with the mid-passage dwelling and the two other features. There are also similarities in raw material frequency between the dwelling and open-air activity areas, suggesting that they are contemporaneous features left by one or two families camping here for a short period of time during the warm season (Jensen 2006:107).

The present analysis has re-examined each of the inventoried lithic types, which include microblades, a burin-like tool, endscrapers, endblades, and flakes (Table 3). See part 7.2, Appendix A for comprehensive descriptions, and part 10.5., Appendix D for artefact illustrations.

A total of 21 microblades were identified in the analysis (7.2.1). Three out of the total 21 specimens exhibit traces of retouch to adjust for hafting. The microblades exhibits few, if any, traits associable to primary stages of production or microblade core rejuvenation, such as crested and irregular dorsal microblade surfaces. Further attempts at refitting fragmented specimens were made but yielded no successful results. Each fragment therefore represents individual microblades that were deposited at Innartalik I during tool maintenance. Thus, only the five complete pieces could possibly have been knapped on site. The flake material of quartz suggests that some degree of core preparation also occurred at the site.

Table 3: Lithic types and raw materials identified in the assemblage from Innartalik I.

Innartalik I	Microblades	Endblades	Endscrapers	Burin-like tools	Flakes	SUM
MCQ						
Blue-white	7	1	3		39	50
Grey	1				2	3
Light brown	1				1	2
Red-brown					10	10
Red-yellow	2					2
Burned	3				1	4
Killiaq						
Nuussuaq		2		1	33	36
QC						
n/a	10				12	22
SUM	24	3	3	1	98	129

Three specimens from the Innartalik I assemblage were identified as lithic endblades (7.2.1). Two of the specimens, both of light grey *killiaq*, have previously been refitted. The third identified endblade is a proximal fragment of blue-white MCQ. The refitted fragments of a polished endblade are together the remains of a distal fragment, interpreted to be the remains of a polished endblade discarded at the site. The polished surface of the flakes suggests that they are fragments of a finished endblade component.

The three endscrapers collected from Innartalik I were all included in the present analysis (7.2.2). Each was found in separate quadrants within the same square (49x/99y). Each scraper has been made from a blue-white MCQ, and have been deposited during events of tool maintenance—likely replaced by prepared components kept in supply. The scrapers are morphologically similar, while their sizes differ. The largest specimen measures 45,8 mm in length and 34,5 mm in width and has been shaped from raw material of relatively poor quality (as suggested by raw material inclusions) by what appears to be direct percussion technique without heat-treatment. The specimen was initially categorised into the preform stage of endscraper production. However, the position of flaking removals on the ventral surface suggests shaping for hafting. It has been expediently shaped from a large flake, where the corticated surface has been used as a scraper edge.

The second largest specimen (l: 23,6; w: 18,3) has been knapped into a shape easily associated with a stage of tool-usage. As with specimen IN1, the positioning of the ventral scars on the distal end suggest that removals were made to accommodate hafting. Only a portion of its total surface was reduced following heat treatment, specifically the retouch scars on the working

Table 4: General size measurements and raw material composition of examined flake debitage from Innartalik I

Innartalik I	0-1 cm ²	1-2 cm ²	2-3 cm ²	SUM
MCQ				
Blue-white	36	3		39
Grey	2			2
Light brown			1	1
Red-brown	3	7		10
Burned	1			1
Killiaq				
Nuussuaq	18	14	1	33
QC				
n/a	12			12
SUM	72	24	2	98

edge. The cortex on the ventral surface suggest that the component was produced from a nodule with a mass close to that of its final form.

The third specimen has been carefully knapped to a small size by pressure-flaking, measuring l: 14,8; w: 13,1; t: 4,3 mm. Its entire surface appears to have been knapped following heat treatment. By the level of flaking precision, the small size, along with the complete glossy surface associated with heat-treatment, it is conceivable that the specimen was discarded after several episodes of tool rejuvenation. However, discernible ventral attributes of the flaking surface suggest that the artefact is close to the size of the flake preform. Furthermore, the small proximal area indicates a haft specifically designed for a small scraper component. It is therefore unlikely that the component was subjected to rejuvenation knapping.

A single, typologically distinct burin-like tool made from Nuussuaq *killiaq* was identified in the site assemblage from Innartalik (7.2.3.). A few *killiaq* flakes matched the grey *killiaq* type of the burin-like tool but attempts at refitting suggests that they were not removed from the component. The component was neither produced nor rejuvenated on-site and can thus be considered deposited during tool maintenance by component replacement.

Overall, the flake material (Table 4) predominantly suggests events of component rejuvenation by pressure-flaking, while flakes of quartz crystal might be associated to the preparation of microblade cores during microblade production (7.2.5.).

Summary

The present analysis supports the interpretation that the lithic assemblage from Innartalik I was deposited following activities involving the replacement of prepared lithic components. Evidence of primary lithic production is scarce. Instead, the flakes suggest short sequences of raw material testing and bifacial component rejuvenation. The analysis therefore strongly suggests that the lithic assemblage was deposited following a single, brief occupation where lithic materialities were involved in activities of tool kit maintenance. As such, the analysis suggests that people transported highly prepared tool kit supplies consisting of prepared components and microblade cores that mitigated the need for lithic production. Besides a few microblades knapped from prepared cores, no new components were produced at the site. The few available traces of primary production suggest that people performed limited testing and preparation of procured nodules. While this

neither resulted in highly prepared preforms or lithic components, its allowed people to evaluate the potential of lithic raw material for future component production.

3.4.3. *Umiartorfik A, B, and C*

The site of Umiartorfik was discovered during archaeological survey in 1995 (Jensen et al. 1995). It is geographically situated on a low-lying point, 14 meter long and 12 meter wide, extending into the inlet of Nivaap Paa (Jensen 2006b:150). The site is defined as a multi-component site and has therefore been divided into three separate areas delineated by structural features, of which one is interpreted as a winter dwelling. A trapezoid Thule house is located at the site, which has affected the integrity of the site context in area A. The remaining features have remained seemingly undisturbed by

later human activity. These areas have, however, been eroded by the sea. The large number of findings in area B, together with paved flagstone floors and a covering peat mixed with large stones, has led to the interpretation of Umiartorfik as a base camp settlement that may have been inhabited during both the cold and warm seasons (Jensen 2006b:161). Umiartorfik was likely occupied during the later stage of the Greenlandic Dorset based on the available datings from the site that has yielded a dating of 360-290 or 240-170 cal. BC (Jensen 2006b:160).

During the present analysis, numerous inventoried artefacts were found missing. The discrepant number is largely due to artefacts here being reassigned to different artefact categories, whereas some artefacts might have been displaced after the excavation.

Figure 9: Site map of Umiartorfik, from Jensen 2006b.

3.4.3.1. *Umiartorfik A*

The site area of Umiartorfik A is dominated by the remains of a Thule house. The excavation was therefore aimed at exploring the relationship between the presumed Thule structure and the lithic material found during survey. The excavation was divided into an internal and external zone oriented around the Thule dwelling. The lithic material in both zones have been assigned to the Greenlandic Dorset period. No datings are available from area A.

A significant proportion of the lithic assemblage was located within the perimeters of the Thule dwelling. This has made it impossible to associate the lithic findings to any Greenlandic Dorset dwelling structures. Two crucial taphonomic factors to the formation of the assemblage has been suggested: 1) The lithics were secondarily deposited by Thule people during their stay. 2) The Thule dwelling replaced the dwelling structure of the Greenlandic Dorset occupants, with less disturbance of the lithic scatters (Jensen 2006b:156).

The previous analysis of the lithic assemblage suggests that activities related to the production of microblades was prominent at area A. The relatively large amount of inventoried microblade cores stands out in comparison with other Greenlandic Dorset assemblages from the region.

The number of objects within various artefact categories observed in the present analysis was discrepant to the inventoried amount. Microblade cores, although previously inventoried as part of the assemblage, were completely absent from the collection. The absence of artefacts is here considered the likely result of objects being mixed into assemblages of other site areas as well as objects being re-assigned into different type categories. Lithic types identified in the present analysis include flakes, microblades, burin-like tools, endscrapers, endblades, and sideblades (Table 5). See part 7.3. Appendix A for comprehensive descriptions, and part 10.2., Appendix D for artefact illustrations.

Out of the 50 catalogued microblades from Umiartorfik A, 17 were identified in the present analysis (7.3.5.). Several specimens previously catalogued as microblades were in the present analysis categorised as flakes, which have contributed to the discrepancy. 10 specimens were of MCQ and 7 of quartz crystal. Only two specimens of MCQ featured retouch. Although nine

Table 5: Lithic types and raw materials identified in the assemblage from Umiartorfik A.

Umiartorfik A	Microblades	Endblades	Sideblades	Endscrapers	Burin-like tools	Preforms	Flakes (retouch)	Flakes	SUM
MCQ									
Blue-white	8	7	4		1	1	2	404	427
Grey	1	2						53	56
Dark grey		1						14	15
Brown				1			2		3
Brown-grey								34	34
Light brown		1						22	23
Red-brown								16	16
Brown-yellow			1						1
Green	1							19	20
Burned								6	6
n/a								27	27
Killiaq									
Angissat								27	27
Nuussuaq					8			283	291
QC									
n/a	7							51	58
Quartzite									
White								1	1
SUM	10	11	5	1	9	1	4	957	1004

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Table 6: General size measurements and raw material composition of examined flake debitage from Umiartorfik A.

Umiartorfik A	0-1 cm ²	1-2 cm ²	2-3 cm ²	3-4 cm ²	4-5 cm ²	SUM
MCQ						
Blue-white	278	122	3	1		404
Grey	22	26	5			53
Dark grey	4	9	1			14
Brown-grey	9	21	4			34
Light brown	17	4	1			22
Red-brown	7	5	4			16
Green	13	3	3			19
Burned	4	2				6
n/a	22	5				27
Killiaq						
Angissat	5	16	6			27
Nuussuaq	98	144	36	3	2	283
QC						
n/a	34	15	2			51
SUM	513	372	65	4	2	956

microblade core specimens have been inventoried, none of the specimens were identified in the present analysis.

The flake material of quartz crystal suggests episodes of microblade core preparation. As such, the microblades redefined as flake material remains related to microblade production.

Eight artefacts from Umiartorfik A have been identified as burin-like tools (7.3.3.). Seven specimens are of *killiaq* and a single of blue-white MCQ. The MCQ specimen is the only complete burin-like tool found at the site. The width measurements of the three specimens with a proximal area are 16,8 mm, 10,5 mm, and 6,5 mm, respectively. This suggest that three individual composite tools integrating burin-like components were maintained at the site.

Eleven endblades were identified (7.3.1). The technological attributes and lack of associated fragments suggests that the endblades were deposited after having broken as components in composite tools. These were not produced on-site, but rather replaced during composite tool maintenance. Except for a possible sideblade preform, the five sideblades in the assemblages are indicative of similar events (7.3.4.).

The limited quantity of small bifacial removals observed among a variety of raw materials types in the flake material (Table 6) suggests that several bifacial components were rejuvenated and produced at area A before being subsequently transported away. The frequency and sizes of

Angissat *killiaq* flakes suggest that at least a single adze of the raw material type was produced or rejuvenated on-site. The presence of several *killiaq* flakes of the Nuussuaq-type with traces of polish indicate at least one event where a finished adze was rejuvenated at the area, whereas the remaining flakes indicate that multiple adzes would have either been prepared during the site occupation.

Summary

Due to the taphonomic effects of both site disturbance and museum storage, the lithic assemblage from Umiartorfik A can only be tentatively associated with the adjacent areas. A possible association can be made by the raw material composition of the flake material, that is similar to the other two lithic assemblages by the notable proportions of quartz crystal and Angissat-*killiaq*.

The technological characteristics of the examined artefacts suggests that most were deposited during tool maintenance. The flake debitage and the finished components cannot be associated by raw material, suggesting that the flakes were deposited during production or rejuvenation of components that were subsequently transported away from the site.

3.4.3.2. *Umiartorfik B*

Area B is located on the south-facing shore of Umiartorfik, along a 3-4 meter section of eroded peat covering bedrock and gravel. In addition to the numerous findings of lithic remains, a flagstone pavement with a thin cultural layer was uncovered. The paved area covered approximately 3.5 x 2.5 meters and has been noted to resemble the paved floor at Annertusuaqqap Nuua. The structural remains, abundance of findings, and site relation to sea level allows for a convincing interpretation of the area as a Greenlandic Dorset dwelling (Jensen 2006b:157). Unfortunately, the original integrity of the site has been damaged by erosion that has washed away the front part of the dwelling. Area B yielded the only available radiocarbon datings from Umiartorfik (see part 3.4.3.)

The previous analysis of the lithic assemblage has pointed out how its frequency of polished endblades found in Area B distinguishes the lithic assemblage of Umiartorfik from Annertusuaqqap Nuua and Ik Karlussuup Timaa. Compared to area A and C, area B has a relatively higher proportion of bifacial components, e.g. endblades, burin-like tools, and scrapers. The proportional frequency of microblades is markedly different as well (~25%). On the other hand, the frequency of microblade cores (8%) is relatively high. The raw material variability exhibits broadly similar

relative frequencies of MCQ and *killiaq* as seen in other large assemblages of Greenlandic Dorset lithic material. However, higher proportions of quartz crystal and Angissat *killiaq* is observed at Area B.

Despite the effects of erosion, the lithic deposit at Area B exhibit clearer patterns of spatial distribution. The majority of lithics are associated with larger concentrations located in the centre of the dwelling remains, at either side of the hearth area. Furthermore, a concentration of lithic artefacts was found outlining a flagstone pavement (Jensen 2006b:158).

While numerous artefacts were absent from the site assemblage of area A, several of the artefact categories identified in the assemblage of area B included a larger number of specimens than has been inventoried. As was stated earlier, this suggests some degree of mixing between the two assemblages. Lithic types and raw materials identified in the present analysis is presented in Table 7. See part 7.4, Appendix A for comprehensive descriptions, and part 10.3., Appendix D for artefact illustrations.

A total of 109 microblades were examined; 73 of quartz crystal and 36 of six different variations of MCQ (7.4.6.). Overall, the specimens exhibit a wide variety of technological characteristics that represents the wider range of the microblade *chaîne opératoire* of production.

Microblades with retouch dominate specimens of MCQ, suggesting deposition following component replacements. Microblades of MCQ as well as quartz crystal include specimens with crested surfaces, strongly indicating the preparation of microblade cores and the production of new microblade components. Crested microblades are more frequent among quartz crystal specimens.

The assemblage of microblade cores are dominated by specimens of quartz crystal, characterised by small sizes and consistent occurrence of cortex (7.4.7.). Numerous quartz crystal preforms of similarly small sizes were identified as well. This observation along with the limited number of removal scars among the cores suggests that the regionally available quartz crystal allowed only limited sequences of microblade production.

Furthermore, eleven quartz crystal microblade cores feature distinctly hinged removal surfaces. Though such a high proportion of failed removals would suggest knapping by less skilled individuals, one must consider the potential difficulty of knapping such minute cores. Considering this, the high frequency of microblades with crested surfaces might be considered a result of raw material properties requiring more frequent adjustment during production.

The four cores of MCQ can arguably be considered the final deposit of cores that had circulated between several sites where they were utilised for microblade production. Comparing the raw material variability of MCQ microblades and microblade cores corroborates the interpretation, as the microblade assemblage includes a wider variety of MCQ types than seen among the cores, suggesting the transit of other cores. While a few examples of economic production of quartz crystal microblades has been observed, it seems that the properties of MCQ allowed easier curation of cores.

Ten burin-like tools were identified (7.4.4.). The specimens are all made from *killiaq* of the Nuussuaq type. Four specimens were intact, and an additional complete specimen has previously been refitted from two fragments. Notable among the specimens are the largest specimen yet to have been recorded (UMB2/3), a large, narrow, preform that has all the typical characteristics of a

Table 7: Lithic types and raw materials identified in the assemblages from Umiartorfik B

Umiartorfik B	Microblades	Microblade cores	Endblades	Sideblades	Endscrapers	Sidescrapers	Burin-like tools	Adzes	Preforms	Flakes (retouch)	Flakes	SUM
MCQ												
Blue-white	28	2	29	10	6	3			5	6	1361	1450
Grey	4		4	1	1				1		60	71
Grey (banded)					1							1
Light grey	1		1									2
Light grey (banded)			1									1
Dark grey		1	1		1	1				1		5
Brown-grey	1		2	1						1	107	112
Brown			2									2
Brown (banded)					2							2
Light brown			4		1						17	22
Red-brown		1	3								24	28
Brown-yellow						1						1
Green	1		3			2					67	73
Red-green										1		1
Red												0
Black w/ inclusions				1								1
n/a			1						1		26	28
Burned	1										12	13
Killiaq												
Angissat			3					1	2	5	426	437
Nuussuaq			11	1	1		10	11	3	5	1548	1590
QC												
n/a	74	21			2				8		155	260
Quartzite												
White			1								2	3
SUM	110	25	66	14	15	7	10	12	20	19	3805	4103

burin-like tool but without polish (UMB12), and a large, but broadly shaped, specimen with distinct traces of knapping errors (UMB9). Specimen UMB6 represents the other end of the burin-like tool size spectrum, being among the smallest burin-like tools specimens examined in the present study.

The larger specimen as well as the large preforms suggests that the site occupants could afford to dispose objects with a large amount of remaining raw material mass. The varied size and morphology of the complete specimens indicate that burin-like tools were used as components for composite tools of significantly different sizes. This suggests that people occupying the site utilised a repertoire of similar tools for different tasks. That these individuals decided to leave behind such considerable amounts of useable raw material points to a circumstance where they were already well-supplied by preforms or prepared components.

A total of fifteen endscrapers were examined (7.4.2.). Of these, twelve were catalogued as stray findings from the eroded shoreline. Thus, only a single specimen was found within the excavated area. The artefacts display a variety of raw material types, measurements, as well as technological characteristics. Three specimens—one of *killiaq* and two of quartz crystal—are rare examples of endscrapers made from these raw materials. Signs of heat treatment are visible on all but one endscraper of MCQ. Each of the specimens were most likely deposited during tool maintenance; replaced after circulation as part of composite tools by components either produced on-site or previously prepared components kept in supply.

A similar inference is drawn from the 7 sidescraper specimens (7.4.3.). These vary considerably in size, suggesting that such components were used in a repertoire of similar tools.

The amount of remaining cortex (~25%) on the quartz crystal endscraper specimen UMB15 indicate a short series of knapping operations between the nodule shape and the final morphology. Three specimens of MCQ featuring cortex are also indicative of limited sequences of operations from procurement to usable component. These characteristics suggests that the artefacts were made from relatively small nodules similar to the desired component morphology and size.

A total of 66 endblades were examined (7.4.1.). The raw material composition of endblades are dominated by MCQ but feature a notable proportion of *killiaq* and a single specimen of quartzite. The specimens of MCQ feature a broad variety of colours, suggesting that most were produced from individual nodules (Table 7).

Eight endblades featured some degree of corticated surface, ranging from ~20% to ~60%. It must be kept in mind that most of the specimens featuring cortex are fragments, and as such does

not necessarily represent the total amount of cortex on the original objects. A commonality among these is a relatively limited number of flaking scars, indicating a minimal difference between original nodule size and the discarded object. The assemblage includes both finished endblades and possible preforms. The eight endblades therefore showcase how the *chaîne opératoire* (including use and rejuvenation) and material histories of lithic endblade components would vary considerably. An example is the raw material properties of Specimen UMB35 that indicate knapping without heat-treatment. Overall, most of the endblades were likely circulated prior to the site occupation as part of composite tools. The presence of preforms stands as evidence of on-site component production, pertaining to broader tool kit preparations.

None of the thirteen endblades of *killiaq* were intact. Considering the raw material composition of available *killiaq* endblades from Umiartorfik, only the four specimens of Angissat-*killiaq* corroborates the interpretation of the site assemblage indicating a development towards a localising of raw material utilisation. The specimens are all fragmented, each fragment representing an individual specimen. Specimen featuring distinguishable artefact morphologies are dominated by triangular-oval specimens (6), along with a single oval specimen. Most of the fourteen endblade specimens of *killiaq* resemble the generic polished endblade type morphology.

Some minor morphological variability is seen among identified sideblades. The fourteen identified specimens were divided into two tentative morphological categories: rounded and rectangular. Round specimens (9) represents the typical oval shape, while rectangular specimens (5) feature angled corners. Rectangular specimens are generally larger, with less delicate knapping removals. The most prominent example among the rectangularly shaped specimens is Specimen UMB14, which is among the largest sideblades identified in the present study (l: 36,6; w: 22; t: 6,5 mm). It features relatively crude removal, suggesting that it was a discarded after failed sideblade production.

The twelve adzes present in the lithic assemblage have been made exclusively from *killiaq*. Eight of these were collected from the foreshore of the site, making it impossible to infer any kind of spatial patterning. None of the specimens feature corticated surfaces. The four complete specimens are observed to be of relatively small size. Compared to adze specimens from the assemblage of Annertusuaqqap Nuua, the specimens from Umiartorfik B feature a higher frequency of removals scars, suggesting a more deliberate and careful production and curation of the objects.

The flake material of MCQ is dominated by the blue-white type (Table 8). As both preforms and retouched flakes are also dominated by the raw material type, this suggests that the flakes to some extent were deposited during early stages of nodule preparation. The significant proportion of small bifacial removals indicate that production from the raw material resulted in several finished or rejuvenated components as well as prepared microblade cores. The variety of other MCQ types are primarily indicative of brief sequences of bifacial component production and/or rejuvenation. These patterns suggest that people had procured nodules of blue-white MCQ more recently than other types. These were either deposited during production from small nodules similar in size and shape to the finished component, or after having circulated as finished components or highly prepared preforms prior to the site occupation.

Table 8: General size measurements and raw material composition of examined flake debitage from Umiartorfik B.

Umiartorfik B	0-1 cm ²	1-2 cm ²	2-3 cm ²	3-4 cm ²	4-5 cm ²	5-6 cm ²	SUM
MCQ							
Blue-white	815	535	10	1			1361
Grey	36	22	1	1			60
Brown-grey	53	52	1	1			107
Light brown	10	7					17
Red-brown	19	5					24
Green	47	18	2				67
n/a	14	12					26
Burned	8	4					12
Killiaq							
Angissat	136	248	26	13	1	2	426
Nuussuaq	688	828	22	8	1	1	1548
QC							
n/a	95	56	4				155
Quartzite							
White	1	1					2
SUM	1922	1788	66	24	2	3	3805

Considering the presence of *killiaq* adzes of both the Angissat and Nuussuaq type along with the frequencies of different flake sizes observed between both types, it can be inferred that people also brought several *killiaq* nodules to the site. These were subsequently involved in the production of new adzes. Traces of polish, suggesting rejuvenation of either burin-like tools or adzes, are most prominently observed among flakes of the Nuussuaq type.

Summary

The present analysis indicates that the site assemblage from Umiartorfik B was formed by base camp occupations where a broad range of different lithic components were produced, rejuvenated, and replaced. This diversity is not only seen in raw material composition and lithic types, but also by the variability of technological attributes among the different lithic component types. The diversity of raw material types allows inferences suggesting that numerous specimens were produced by brief sequences of knapping operations. The complex variety of events indicated by the assemblages strongly indicate that the site was occupied by several individuals that afforded considerable efforts into both the repair and production of composite tools to prepare their tool kits.

3.4.3.3. *Umiartorfik C*

A total of 1463 artefacts were collected from area C, which covered an area of 6.5 m². The lack of structural remains—save a few flagstones and large natural boulders—and the scattered distribution of lithic artefacts suggests that the area was an open-air activity area (Jensen 2006b). No datings are available from the site.

Possible site disturbance by Thule-activity has been indicated at Umiartorfik C. However, unlike area A this disturbance does not appear to have inflicted the deposited distribution of the Greenlandic Dorset lithic artefacts (Jensen 2006b:160).

The assemblage is dominated by microblade technology. The remaining material dominated by flakes, but also includes a single tentative endscraper of quartz crystal and four preforms (Table 9). See part 7.5, Appendix A for comprehensive descriptions, and part 10.4., Appendix D for artefact illustrations.

36 microblades were examined. As with the microblade assemblage from area B, specimens of quartz crystal dominate the assemblage. 26 specimens from area A have been made from quartz crystal, while 10 are of MCQ (Table 9). Quartz crystal specimens have exclusively been

categorised as microblades, as there were no specimens featuring traces related to dorsal front preparation or featured retouch. The MCQ specimens features two microblades with retouch along with two blade preparation removals.

Among microblades of quartz crystal, 13 specimens were identified as intact. None of the remaining fragments were refitted, suggesting that most of these were the result of component replacements. Two intact microblades were refitted. The two specimens were found in the same site quadrant (x102/y100:1), evidence of on-site microblade production.

Six microblade cores were identified in the collection from Umiartorfik C (7.5.3.). Five specimens are of quartz crystal, and one of blue-white MCQ. A single specimen of quartz crystal is classified as a core fragment (Specimen UMC5). Three of the quartz crystal specimens featured corticated surfaces: Specimen UMC2 with ~20%; Specimen UMC3 with ~40% coverage; and Specimen UMC4 with ~60%. The large amount of cortex indicates the generally small size of quartz crystal nodules, and limited sequences of knapping operations.

Table 9: Lithic types and raw materials identified in the assemblages from Umiartorfik C.

Umiartorfik C	Microblades	Microblade cores	Endscrapers	Preforms	Flakes	SUM
MCQ						
Blue-white	7	1		1	511	520
Grey	1				40	41
Dark grey					2	2
Brown-grey				1	111	112
Brown					1	1
Light brown					18	18
Green-brown					1	1
Green					39	39
Red-brown					8	8
Red					29	29
n/a	1					1
Burned	1				4	5
Killiaq						
Angissat					98	98
Nuussuaq					421	421
Quartzite						
White					2	2
QC						
n/a	26	5	1	2	68	102
SUM	36	6	1	4	1353	1400

Table 10: General size measurements and raw material composition of examined flake debitage from Umiartorfik C.

Umiartorfik C	0-1 cm ²	1-2 cm ²	2-3 cm ²	3-4 cm ²	4-5 cm ²	SUM
MCQ						
Blue-white	343	154	13	1		511
Grey	10	29		1		40
Dark grey		2				2
Brown-grey	44	57	10			111
Brown		1				1
Light brown	15	3				18
Green-brown		1				1
Green	23	14	2			39
Red-brown	3	1	4			8
Red	19	8	2			29
Burned	3	1				4
Killiaq						
Angissat	22	59	14	2	1	98
Nuussuaq	157	200	53	11		421
Quartzite						
White		2				2
QC						
n/a	35	31	2			68
SUM	674	563	100	15	1	1353

The relatively large number of removal scars on two separate fronts featured on Specimen UMC1, made from quartz crystal, suggests both high quality raw material and skilfully executed knapping operations. Furthermore, when compared to the high frequency of cortex seen among the quartz crystal specimens, the complete lack of cortex suggests that the original preform of the core was relatively large compared to the size of preforms inferred in the overall material.

The single microblade core of MCQ) is considerably larger in size compared to the quartz crystal specimens, it is also relatively large compared microblade cores in other assemblages from the region. The negative removals at its front suggests that the object is a distal rejuvenation removal made from a larger core. This was followed by a single hinged removal, probably a failed attempt at further microblade production. This removal was likely an attempt at making expedient use of debitage from the rejuvenation of a much larger microblade core. From this it is possible to conceive a scenario where the ‘leftover’ from the knapping procedures of a more experienced

knapper was handed over to a less experienced member of the group to make further attempts at microblade production. The artefact therefore indicates both a late and early stage of microblade production, involving at least two persons. Overall, the various technological patterns, e.g. raw material composition, few discernible knapping errors, and different sizes—suggests that the activities occurred within a single occupation, if not during a single event involving several individuals.

The examined flake material strongly suggests that a variety of lithic components were both produced and rejuvenated at the site. The variety of raw material types, including MCQ, *killiaq*, and quartz crystal (Table 10), suggests numerous episodes of lithic knapping on different objects, predominantly pressure-flaking for rejuvenating smaller components—with only a small proportion of larger flakes with cortex indicating the preparation of and production from larger nodules. Both rejuvenated and newly produced components were subsequently transported away from the site.

Summary of Umiartorfik

The lithic assemblages from Umiartorfik were deposited following several occupations of various duration, and likely during different times of the year. Although no direct links between the assemblages were identified, the raw material composition of microblades suggest that at least some of the occupations included activities distributed across the areas.

The analysis points to a flexible, interchangeable use of similar component types for different tasks. The assemblages of endblades and burin-like tools were most indicative of this. The diversity of sizes and designs among finished components demonstrates how these were produced and incorporated into composite tools that would have been interchangeably used. This interchangeability would have occurred during related but different tasks throughout stages of organic material procurement and production.

The most prominent component type deposited among the site assemblages are microblades. Episodes of microblade core preparation and rejuvenation occurred more frequently at dwelling area B, while the low proportion of similar depositions at area C suggests that it was formed primarily by component replacements and knapping from cores prepared elsewhere. This indicate that activities specifically at dwelling areas pertained more to the preparation of nodules, whereas activities at the open-air site pertained to production from previously prepared nodules

(i.e. preforms and microblade cores). It appears that quartz crystal was to a larger degree brought in as unprepared or lesser prepared nodules to produce new microblade components. Conversely, lithic remains of MCQ indicate microblade production from highly prepared cores that had likely remained in circulation for a longer period.

Whereas the deposition of quartz crystal is predominantly associated with the production of microblade technology, MCQ and *killiaq* were deposited from a more complex range of activities that involved a broader variety of lithic component technologies. These include the production, replacement, and rejuvenation of multiple different component types. It is here considered unlikely that the finished components in the assemblage were used exclusively within the site area. Instead, most of these would have circulated prior to the site occupation as part of a variety of composite tools. The finished components that were deposited at the site suggests that people frequently produced bifacial components from individual nodules similar in size and shape to a desired component design. This allowed for brief sequences of bifacial component production, as is further indicated by the relatively scarce amount of bifacial flake removals observed among several different raw material types.

From these factors, it can be inferred that the lithic depositions at Umiartorfik was formed by people that brought numerous procured nodules to the site along with their existing tool kits. These tool kits included tools that may have already required maintenance or would eventually require this from use during the site occupation. Replacement components were made available from not only the production of recently procured raw material of diverse types, but also by previously prepared reserve components and microblade cores. The diverse responses to the requirements of multiple different composite tools and lithic raw materials observed at Umiartorfik can be generalised as tool kit preparations. These preparations entailed immediate responses to the maintenance of composite tools as well as to the vital production of component supplies that prepared people for their departure from the site.

3.5. Discussion

In this chapter, analyses of lithic assemblages from three sites in Qeqertarsuup Tunua, Central West Greenland has been presented. These include larger assemblages from the base camp sites Annertusuaqqap Nuua and Umiartorfik, and a small assemblage from Innartalik I. The case-study has demonstrate the potential of and piloted the approach of my thesis by explicitly critiquing

specific interpretations of previous research, primarily by Mikkel Sørensen (Sørensen 2012) and Jens Fog Jensen (Jensen 2006b).

Through the analyses it has become evident that formation of lithic assemblages during the Greenlandic Dorset of Qeqertarsuup Tunua did not follow strictly linear, seasonal cycles of lithic production. From the analyses, it is indicated that crucial factors to the formation of lithic deposits were activities pertaining to strategies of *tool kit preparation* and *tool kit maintenance*. These strategies defined and were defined by contingent assemblages of relations between humans, lithics, composite tools, and the regional environment. We can now recognise these strategies by the relations between people and lithics that were highly structured by composite tool kit relations.

The analysis strongly indicates that component production afforded greatly to the required and existing repertoires of similar composite tools. It has been inferred that lithic components were produced to accommodate a broader range of composite tools rather than to standardised lithic production that only afforded to traditional knowledge. The case-study therefore points to a ‘typologically invisible’ diversity of tools during the Greenlandic Dorset. The assemblages of endscrapers and burin-like tools are here highlighted. Whereas larger and more crudely shaped endscrapers included in the present study have previously been categorised as preforms, my analyses suggest that these would likely have been utilised as tool components. Crucial to this recognition was that most of these featured distinct ventral removals that shaped a hafting base, indicating that these had in fact been previously fitted into composite tools.

In a study on Dorset sealskin processing at Philip’s Garden, Newfoundland, Renouf and Bell (2008) provides an extensive summary of ethnographic recordings of skin-processing to help identify specialised skin-processing tools in the archaeological tool assemblage from the site. Cutting and scraping tools are here presented as the two essential components of skin-processing (after Oakes 1987). The Inuit *ulu* is showcased as an ideal type of cutter tool for detaching skin from meat, fat, and fibre. Scrapers, typically used for degreasing and to stretch and soften the skin, are here divided into two general categories: straight-edged and convex-edged. These different types of scrapers would be used in different stages of skin-processing, where the straight-edged components were used during early stages of processing and convex-edged scrapers during the later and finer stages of processing. Assuming that skin-processing provided similar affordances during the Greenlandic Dorset period of Qeqertarsuup Tunua, the diversity of scraper sizes and

designs provided people specialised tools that were likewise used in different stages of processing and production.

While the relatively limited quantity of sidescraper specimens disallowed assessments of sidescraper tool diversity, they still raise questions of how and why such distinct components were used and eventually deposited. The assumed functionality of these components as scrapers makes it reasonable to associate their materiality to that of endscrapers. As such, it is conceivable that scrapers of different designs and sizes were used interchangeably during crafting sequences. Sidescrapers might be considered a more specialised lithic component that would maintain a broad repertoire of available scraper tools that suited different tasks. Thus, sidescrapers were a morphologically unique but fringe element of the broader tool kit—their function actualised only under specific circumstances.

The examined endblades also point to variations in component design that cannot be solely bound to specific stages of production. This argument is based on the inferred relations between raw material properties, component morphologies, and attributes critical to composite tool hafting. To identify such variations, intact specimens from each assemblage have been compared according to measurements in relation to morphology (Figure 19, Appendix A).

These comparisons reveal no clear grouping of size classes among the different lithic types and their design variations. This might be the result of two factors: One is that the sample of objects is too small, the other that composite tool kits of people in the region relied on a variety of organic raw materials (of different sizes and qualities) for making hafting components. Regardless, the heterogenous variability in component size, despite homogenous technological attributes, indicate that tool assemblages frequently affected lithic production and maintenance; by raw material properties and availability, material-material relations, or by different functional affordances. Occasionally, these affordances may even have resulted in the production of novel types of lithic components such as polished endblades of *killiaq*. In situations where people were in shortage of suitable MCQ, they would transpose their knowledge and skill in producing burin-like tools to the production of endblades.

The case-study suggests that a general strategy for tool kit maintenance during the Greenlandic Dorset of Qeqertarsuup Tunua was to keep supplies of prepared components. Supplies of reserve bifacial components would be produced to provide portable and ready replacements for the repertoire of tools that people carried during dispersed movements. As bifacial components

were most often produced from individual nodules, this means that their production would necessarily have afforded greatly to the existing or required composite tool designs. Supplies of microblade components would be provided by not only by prepared components, but also by prepared cores that allowed brief and efficient production whenever necessary.

Each of the site assemblages are characterised by depositions from tool kit maintenance. Such maintenance primarily involved component replacement, and some degree of component rejuvenation. This was evident in each of the lithic assemblages, but more prominently in the smaller assemblages from Umiartorfik and Innartalik I. The distinct raw material type variation has helped indicate that people would frequently choose to make only a few removals from bifacial components, cores, or preforms before transporting the objects away from the site. These removals typically left behind small flakes from pressure-flaking. However, it is important to note that small flakes from pressure-flaking cannot be unequivocally defined as remains of later stages of production or rejuvenation. The technological attributes of numerous bifacial components indicate that they were produced from small, natural flakes that required only a few pressure-flaking removals to be made into useable components (Sørensen 2012:201). Lithic production from small natural flakes have thus likely obscured the potential to infer initial stages of production. This also complicates distinctions between component production and rejuvenation, but only a few finished components rarely exhibited traces indicating protracted rejuvenation. Considering the inferred strategy of tool kit curation during the Greenlandic Dorset of Qeqertarsuup Tunua, it is likely that events of component rejuvenation was highly contingent on the supply of replaceable components.

Microblades constitute by far the most abundant lithic component types in Greenlandic Dorset assemblages from Qeqertarsuup Tunua. Compared to bifacial components, microblades would be replaced at a higher rate than other types of lithic components. It has been noted how their production generally occurred as brief episodes of knapping that involved only a minimal number of removals. This is made clear by the rich variety of raw material types that exhibit different stages of production and circulation. Identified specimens associated with the production of microblades, such as cores and microblades with traces of core preparation, strongly suggests expedient responsiveness to material properties during production. In other words, people would often adapt sequences of production according to the raw material properties.

The case-study also suggests that microblade production was significantly territorialised by human-human interactions. This is primarily indicated by the scarcity of knapping errors among

microblade specimens, indicating that microblade production was reserved to skilled individuals, and that becoming one was a strongly supervised process. Knapping errors are more frequent among core specimens, but these are most likely the result of cores becoming exhausted of potential for further knapping. Furthermore, maintaining a supply of microblades in the region afforded the presence of appropriate tools for production, i.e. pressure-flakers, as well as a controlled environment for applying heat-treatment of procured nodules of MCQ. Thus, the production and maintenance of microblade knives constituted important relations that helped socially regulate and monitor the acquisition of knapping skills and complementary tool kit equipment during the period.

The larger assemblages from Annertusuaqqap Nuua and Umiartorfik were deposited following complex diversities of events involving both lithic component production and composite tool maintenance. These involved longer sequences of bifacial and microblade core production, as well as brief events of tool kit maintenance where lithic components were replaced by reserve components kept in a portable supply. Both the events of composite tool maintenance and lithic component production at these sites can be regarded as part of tool kit preparation.

The various effects raw material properties had on component production and tool maintenance is also most notable among assemblages of microblades. The comparison of MCQ and quartz crystal from Umiartorfik has indicated how production from quartz crystal required more frequent core preparation and rejuvenation compared to production from MCQ. The effects of raw material properties could also be indicated by examining the use of heat treatment. Although prevalent, indications of its use suggest that it was used expediently rather than consistently, enabling the production of components from small nodules. The technique was therefore immensely useful in a region where a large variety of MCQ was available, heterogenous in size, shape, and quality. In the regional geological context of Qeqertarsuup Tunua, it aided knappers in expediently making desirable components from small natural flakes with only a few sequences of bifacial retouch. As its use would require a stable heat-source, this contributed in territorialising lithic production to dwelling areas.

The examined remains of preforms and large flakes at Annertusuaqqap Nuua and Umiartorfik suggests that people transported procured lithic raw material across considerable distances before utilising it for component production. This points to base camp dwellings as the preferred locations for primary stages of production, even when the sites were located far away from source areas. This goes against Jensen's interpretation that people in southern Qeqertarsuup

Tunua were not involved in procurement of lithic raw material, but rather points to Sørensen's interpretation of strategies of 'embedded procurement'. However, it was a form of embedded procurement that afforded significantly to the relations and strategies defined by lithic as well as tool kit materialities, and their histories of tool kit curation.

During the colder seasons, lithic deposits were formed during higher group densities and stronger commitments to social regulation by human-human relations, as indicated by the spatial distribution of lithic depositions (cf. Jensen 2006b). Lithic depositions in the warmer seasons were formed during dispersed activities across the landscape, where prepared tool kit supplies were utilised for tool kit maintenance. Component rejuvenations would likely only occur if the supply of specific components had run low. As lithic raw material access was often highly partial, maintaining composite tools during dispersed movements depended greatly on the tool kit preparations that preceded during base camp occupations.

Although base camps emerged in the ecologically bountiful southern part of the region, people were still required to make long-distance movements to procure lithics and other vital resources at different times of the year. This likely resulted in dispersals that reached far beyond the region as well as within it. Even in what can be regarded among the most favourable regions of Greenland, people lived 'in transit'. This is indicated by the retained emphasis on expedient use of lithic raw materials, and strategies for lithic component production that accommodated prudent curation of portable tool kits.

The higher proportion of both Nuussuaq and Angissat *killiaq* at Umiartorfik site compared to the older site of Annertusuaqqap Nuua certainly connects the site to specific regional sources of lithic raw material. However, my analyses do not suggest that this represent a regionalisation where people became committed to specific sources in the landscape. Instead, people in the later stage of the Greenlandic Dorset period had become more familiarised to the regional availability of raw material. The human-material relations inferred from the lithic assemblages suggests that people retained highly flexible and expedient procurement strategies throughout the period. Such flexibility made it possible for people to be less concerned with access to lithic sources, supporting the ability of groups to disperse into landscapes where raw material availability was unfamiliar. In turn, this allowed groups to be more responsive to changes in the availability of other resources, such as game species.

Although lithic production was highly non-linear and flexible, it did not manifest in spontaneous events of lithic component production across the landscape. Instead, these events were structured by portable tool kits – highly dependent on the available supply of reserve components as well as the material relations of existing composite tools. This had important effects on raw material choice.. Upon discovering or revisiting a lithic outcrop, tool kits would influence decisions on the quality and quantity of raw material to be procured. Nodules or flakes close in shape and size to the desired component design would be preferred, mitigating the amount of hauled raw material as well as the later efforts spent in lithic production. In these events the choice, testing and initial preparation of lithic raw material would hardly defer to mental templates of lithic production. For people during the Greenlandic Dorset, these activities were highly situated and responsive to the affordances of portable tool kit assemblages.

3.6. Conclusion

Through the deployment of the relational approach outlined in the previous chapter, we can now recognise how lithic materialities and their production during the Greenlandic Dorset period of Qeqertarsuup Tunua was structured by tool kit materialities and their demands for preparation and maintenance.

During the period, the relations between people, lithics, and tool kits enacted and reified strategies that prioritised keeping portable supplies of highly prepared lithic components and preforms (including microblade cores). The way that these strategies were enacted had significant effects on the procurement, production, and deposition of lithics at the time. Lithic production *per se* was primarily conducted at dwelling sites where people gathered during the cold season. It was here part of tool kit preparations. Efforts into such preparations allowed people to expediently repair and maintain tools *without* affording efforts into lithic production. Another effect of these preparations would be that people were not required to immediately produce components from the diverse lithic raw materials procured during long-distance movements. This interpretation does not lend to the idea that people wilfully organised lithic production linearly across the landscape according to fixed mental templates, as argued by Jensen. The new insights generated by the regional case-study instead indicate that the time and place for lithic production pertained more so to the constant demands of tool kit technologies. This created important recursive and dynamic effects that contributed to the emergence of a regionally unique Greenlandic Dorset lifeway.

From sources of various lithic raw materials, people would often select nodules that were approximate in form and size to the specific component types required by various specialised tools. By the demands of their tools and tool kit supplies, groups prudently assessed and anticipated the necessary amount of material to be procured and subsequently transported. It was also preferable to transport the raw material to dwelling sites where they could utilise heat-treatment to enhance the properties of the regionally available MCQ. These combined factors territorialised lithic production to larger base camps and highly expedient rather than standardised procedures of production. As long as the required design was achieved, people would produce components from most any raw material type by various knapping procedures.

Lithic production was situated by strategies oriented around prudent and highly responsive curation of composite tool kits. Tool kit technologies thereby enabled but demanded the continuation of lifeways that prioritised resource diversification and highly dispersed demographic movements. With this perspective we can recognise that people during the Greenlandic Dorset of Qeqertarsuup Tunua did not wholly commit themselves to the region and its available resources. While the favourable environmental conditions in the region likely supported larger populations over longer time, the sustained presence of people in the region was not the result of increased commitment to the landscape. It was rather a regionalisation by familiarity, where groups would revisit various areas of its landscape while retaining their ability and desire for long-distance movements into other regions.

To conclude, this new perspective would not have been possible by treating lithic remains from the region as representations of mental templates of production, as previous *chaîne opératoire* analyses have. Instead, *chaîne opératoire* analyses of lithic remains framed within a Relational Approach has here allowed explanations of how temporalities of lithic production and deposition emerged from historically contingent interactions between people, lithics and tool kit technologies. This has produced a far more encompassing and historically dynamic perspective on the Greenlandic Dorset lifeways that unfolded in Qeqertarsuup Tunua.

Chapter 4 - Journeys along the Muskox Way – The Greenlandic Dorset of Northernmost Greenland

In this chapter, six lithic assemblages from Peary Land and its adjacent areas in northernmost Greenland are examined with a Relational Approach. The region contrasts significantly from Qeqertarsuup Tunua. It spans the northernmost lands of the world, situating a profoundly High Arctic environment. In its vast and barren landscapes, viable resources are highly dispersed. It is here that some of the very first groups of people ventured after the onset of the Greenlandic Dorset period. Their material remains indicate an expansive yet brief presence. To live here during prehistory required mobility and flexibility in resource use. Its precarious environment has also been consequential to its history of archaeological research. Few scholars have studied the archaeology of the region—and excavations have predominantly been conducted by Eigil Knuth. Only a few of the lithic assemblages from the region have been re-examined after their excavation. Comprehensive cataloguing of Knuth's excavated materials and the redefinition of the regional Independence II culture as part of the Greenlandic Dorset technological tradition has paved the way for the assemblages to be studied further. This work has made the region essential to how we understand the dispersal of the Greenlandic Dorset tradition around Greenland. Thus, the lithic assemblages now serve as representations of an inter-regional rather than regional culture-historical phenomenon, but they have yet to be examined with a deeper interpretative approach. By revisiting these assemblages with the approach of the present thesis, this case-study indicates how a uniquely brief history of High Arctic living along the 'Muskox Way' emerged. This was a history significantly structured by the different demands made by lithic materialities during the maintenance, production and use of composite tool kits. This case-study reveals that during a few forays into the region, groups invested more effort into maintenance of tool kits rather than into production of new lithic components and tool implements. Thus, the case-study indicate that portable tool kits situated a uniquely ephemeral presence of people, structuring their desire for highly prudent and transient interactions with a High Arctic environment that for only a brief period was part of their vast range of movement.

Figure 10: Peary Land and adjacent areas. Map by Erwin Bolhuis.

From the relatively rich archaeological record of the Greenlandic Dorset in Qeqertarsuup Tunua, my study now turns to a geographic area of Greenland that has yielded a far more ephemeral record. The northernmost region of Greenland hold a key position in the culture-historical understanding of the Greenlandic Dorset period as it is adjacent to the Nares Strait – the “Gateway to Greenland” from Canada (Grønnow and Sørensen 2006). The unique character of the regional archaeological record is not only due to its geographic location, however. While it is sufficiently distinct for the assertion of a Greenlandic Dorset period in the area, its archaeological record is remarkably scarce despite favourable conditions for preservation. This scarcity is made even more perplexing by the fact that all reliable datings from the period in the area are within the 800-400 cal. BC calibration plateau. These conditions have seriously challenged attempts at constructing a regional culture-

historical chronology and has mystified our understanding of the brief human history that emerged here during the Greenlandic Dorset period.

The archaeological record of northernmost Greenland is closely tied to the legacy of Eigil Knuth. His 60 years of fieldwork yielded most of the documentation and collections from the region. This legacy is prevalent not only in the culture-historical understanding of the Greenlandic Dorset in the area, but also subsume the history of research and curation of the assemblages themselves. In the second case-study of this thesis, several of Knuths collections from Peary Land and adjacent regions are revisited. As demonstrated in the previous chapter, this will lay out a descriptive, empirical foundation for interpreting how lithic materialities co-created Paleo-Inuit lifeways during the Greenlandic Dorset in the region.

Broadly adhering to the structure of the previous chapter, the first part provides a general overview of the regional geography and environment. For archaeologists, northernmost Greenland represents among the most remote and extreme geographic areas of the world, creating highly challenging conditions for the collection of archaeological material. It was in these conditions that Eigil Knuth recorded and collected most of the available archaeology from the region, and his special relationship to the region is therefore significant to how we understand the emergence of the Greenlandic Dorset in northernmost Greenland. Indeed, it is more the history of Knuths research rather than the assemblages themselves that pivots how the Greenlandic Dorset period here is understood.

Due to Knuth's monolithic role in the regional archaeological research, the history of research is predominantly based on the large, mostly unpublished, material that documents the archaeological sites and collected assemblages here. Furthermore, most of the assemblages have never been re-examined following their collection. Several of the lithic assemblages included in this chapter have now for the first time been revisited, underscoring the need for a historiography of the regional archaeological history. Following the overview of the regional geography and environment, a brief history of research leading to the re-definition of the Independence II to Greenlandic Dorset will be presented. In turn, the first part of the chapter is concluded by introducing the current understanding of the Greenlandic Dorset in the northernmost Greenland—outlining regionally specific research problems and taphonomic conditions that my analyses must contend with.

The presentation of my assemblage analyses is structured slightly different than in the previous chapter. This is due to the quality of documentation as well as the fact that few of Knuths collections have been re-examined (but see Owen 1983; Sørensen 2012). Each assemblage will be introduced with a summary of the original site and its inventoried site assemblage, after which the results of the specific site assemblage analyses are presented. This is followed by a discussion and summarisation of the analyses in the third and conclusive part of the chapter.

4.1. Regional geography, topography, and environment

The material remains of Northern Greenland represents some of the most extreme examples of human environmental adaptations in archaeology. When the extensive geographic area is described in the archaeological literature, Peary Land—the northernmost land of the world—is often emphasised. Geographically, however, the term only refers to the northernmost peninsula of Greenland. The peninsula covers an area of approximately 57 000 square kilometres, extending ca. 375 km east-west and 200 km north-south, bordering Victoria Fjord to the west and the Independence Fjord to the south/south-east. It is also the largest ice-free region of Northernmost Greenland and Greenland as a whole. In his own work, Knuth provided an archaeological definition of Peary Land that also included the southern coast of the Independence Fjord (Knuth 1952:17). The topography of the region is varied, with broad river valleys, low plains, and barren scree slopes on moderately low, plateaued mountains reaching altitudes of over 1000 m a.s.l.

Historical climatic records from northernmost Greenland defines high arctic conditions with low summer temperatures and precipitation (see Moelgaard 1982). Both temperature and precipitation are highly variable depending on local topography and wind conditions. Most precipitation is accumulated as snow during early winter. Snow cover is also variable, easily affected by strong winds that redeposits snow into drifts on lee sides of rifts and ridges. Such conditions leave vast areas exposed and barren throughout the year. Snow typically melts and evaporates during late spring, with snow-free areas appearing during early summer. Following the thawing process, rivers reach maximum water content in the middle of summer followed by rapid recession.

The snow cover and its thawing are essential to life in northernmost Greenland. Richness of vegetation is largely dependent on snow as both protection from the severe winter storms and water supply during growth period. The most substantial plant covers emerge in areas with enough water supply throughout the summer. In higher altitude areas, richer plant covers can be found near

snow-patches on slopes of solifluction soil. In the lowlands, rich vegetation can be found as meadows around streams and lakes. Dense concentrations of vegetation can also be found in association with lemming holes and bird perches, resulting from animal activities in small, sheltered spaces such as on lee sides of large stones (Moelgaard 1982:106). Besides species of migratory birds and small terrestrial mammals such as lemmings, the region includes faunal species such as muskox, caribou, polar bear, walrus, polar fox, and seals.

The material record of region has yielded important zooarchaeological information that indicate the resource base for people during the Greenlandic Dorset as well as the biodiversity at the time (see part 4.3). Faunal remains indicate that muskoxen was a particularly important game species for people living in the region (see part 4.3). Research on muskox behaviour in Peary Land has revealed animal behavioural patterns endemic to the high latitude conditions of the region. Unlike typical muskoxen behaviour, animals living in northernmost Greenland are distinctly mobile due to the patchy availability of vegetation in these high latitude areas (Klein and Bay 1990:278-279).

In this case-study, a straightforward geographical delineation of the research area is made difficult by the selection of site assemblages representing several different areas within or adjacent to Peary Land. While the different areas are well within the High Arctic climatic zone, they do exhibit local environmental variations.

The lithic assemblages included in the present chapter were collected from four areas of Northern Greenland within or adjacent to Peary Land: Wandel Dal, Jørgen Brønlund Fjord, Johannes V. Jensen Land, and Danmark Fjord. Engnæs is the westernmost site, situated at the far eastern end of the Wandel Dal. Three of the assemblages were collected further to the east from sites that lies in close proximity at the mouth of the Jørgen Brønlund Fjord: Vandfaldsnæs, Kap Mylius-Erichsen, and Kap Harald Moltke. The lithic assemblage from Hvalterrasserne was collected from Johannes V. Jensen land, at the northern fringes of Peary Land. Additionally, the lithic assemblage from Kap Holbæk is also included, collected in the southern part of the Danmark fjord. Relative to each other, Hvalterrasserne and Kap Holbæk represents the northwesternmost and southeasternmost fringes of the regional analysis.

4.1.1. *Wandel Dal and Jørgen Brønlund Fjord*

Combined, the east-west oriented valley of Wandel Dal and the Jørgen Brønlund Fjord constitutes a considerably rich and favourable environment and ecosystem in an otherwise extreme High Arctic region. The favourable conditions of the area are reflected in the high number of archaeological sites in the area. Several larger lakes connected by rivers makes up a significant portion of Wandel Dal. Adjacent to large interior icesheets the Aftenstjernesø (Evening Star Lake) is found in the westernmost part of the valley, from which the Sydpaselv river runs eastwards towards the Øvre and Nedre Midsommersø (Upper and Lower Midsummer Lakes) which dominates the valley centre.

4.1.2. *Johannes V. Jensen Land*

This area defines the northernmost part of Peary Land. It is a topographically distinct part of Peary Land, delineated by the 175 kilometre long Frederick E. Hyde Fjord and Nordpasset (Northern Passage) which separates it from the rest of the Peary Land peninsula. Its topography is mountainous, with peaks ranging from 500-600 m.a.s.l along the northern shore while the mountains surrounding Frederick E. Hyde Fjord and the interior rises to heights between ca. 1000 and 1200 m.a.s.l. The limited reach of the glaciers in the area reflects the highly arid climate in the interior area.

Archaeologically, the most thoroughly surveyed area of Johannes V. Jensen land is the NW-SE oriented Frigg Fjord—one of the few side fjords of Frederick E. Hyde Fjord. The Independence I site Adam C. Knuth is the most prominent site in the area with its 25 individually documented features – the remarkable northernmost ruins of the globe. The only Greenlandic Dorset site known from Johannes V. Jensen Land is Hvalterrasserne.

4.1.3. *Danmark Fjord*

As in Johannes V. Jensen Land, only a few Greenlandic Dorset sites are known from Danmark Fjord. This area is made up by a c. 150 km long SSW- NNE oriented fjord that joins with the large Independence Fjord to the northwest. To the east of the fjord lies the large peninsula of Prinsesse Ingeborg Halvø. The fjord narrows towards its head, where one finds the 30 km long Holbæk Fjord. The only side arm fjords in Danmark Fjord are the Næstved Fjord and Sjælland Fjord, both

branching off the western shore. The 17 km long Kap Holbæk peninsula separates the Næstved and Holbæk side fjords at the head of Denmark Fjord. At the point of this peninsula lies the only excavated Greenlandic Dorset site in Denmark Fjord, named after the peninsula. The peninsula is topographically defined by an over 100 m high plateau at its point, with adjacent raised gravel terraces to the south, while the remaining area of the peninsula is made up of a lower-lying hilly landscape.

4.1.4. *The lithic raw materials of northernmost Greenland*

As is the case with the Greenlandic Dorset of Qeqertarsuup Tunua, the current knowledge on the lithic resource base in northernmost Greenland relies heavily on the technological characteristics and type frequencies of raw material in site assemblages. Unlike in Qeqertarsuup Tunua, however, dedicated archaeological mapping of raw material outcrops has not yet been made here. Still, it is essential that the formation, qualities, and the general availability of the material is appreciated for the sake of contextualisation. Here follows a brief summarisation of the geology of northernmost Greenland (after Sørensen 2012:51-53).

MCQ

Microcrystalline quartz can be found scattered across the landscapes of northernmost Greenland. The regional type here is specifically referred to as sedimentary MCQ, originating from bedrock formed by deposits of silicium-rich sediments on sea floors exposed to high pressure or heat. The sedimentary MCQ has subsequently been exposed by the raising, breaking, and folding of the seabed, and in turn made available for procurement by the effects of frost and erosion. Nodules of MCQ found in northernmost Greenland are typically divided into two colour types: blue-grey and black. These nodules are often found in rectangular, tabular shapes.

Dolerite (diabase)

Dolerite refers to medium to fine-grained rocks that generally gives diffuse conchoidal fractures, making it a tough and often difficult material to work with. These rocks are regional to northernmost Greenland and have been formed by igneous intrusions into other types of rock. As raw material, dolerite was primarily used during Greenlandic Dorset for producing large tool components such as adzes (Sørensen 2012:50)

4.2. The history of research on the Dorset of Northernmost Greenland

The earliest archaeological fieldwork in the northernmost regions of Greenland was conducted during the Denmark Expedition between 1906-1908. The expedition would here survey for the northernmost remains of the historical Thule Inuit, discovering several sites that were assigned to this period. Considering the state of archaeological knowledge of the region at the time, the expedition would likely not have been aware of the potential presence of tiny lithic components among the rocks and pebbles at the sites. Another reason, as indicated by Knuths later surveys, may well have been the rich lichen coverage in the area (Knuth 1954:372-373). Still, the archaeological record of Peary Land offers tantalizing clues that might suggest that the members of the Denmark Expedition were unknowingly the discoverers of a 'Stone Age' in the area.

In their compilation of Eigil Knuths archaeological archive, a peculiar cache with a mixed assemblage of artefacts within the dwelling remains of the Paleo-Inuit site Hellebæk in Jørgen Brønlund Fjord is speculated to have been collected by expedition members Ludwig Mylius-Erichsen, Høeg Hagen and Jørgen Brønlund—the first Europeans to reach the fjord later named after one of the three ill-fated men (Grønnow and Jensen 2003:122-123). Among the objectives of the Denmark Expedition was to identify and document the range of historical and concurrent Inuit populations (Thostrup 1911). However, little regard was here given to the possible existence of a prehistoric era preceding the Inuit ancestors. The first person to report and define archaeological findings in the region of what we today refer to as Pre- or Paleo-Inuit, would be Eigil Knuth.

At the onset of his career as an explorer and archaeologist of the northernmost regions of Greenland, Knuth expressed his hope and expectation to here identify the remains of Dorset culture. At the time, the definition of the Dorset was in its earliest infancy in Eastern Arctic human prehistory (see part x, chapter x). Knuths earliest observations were thus broadly defined as Dorset. By todays understanding of Eastern Arctic prehistory this broad definition would more appropriately be broadly defined as Paleo-Inuit (or Paleo-Eskimo). Critical to Knuth's initial definition of Paleo-Inuit findings from Northern Greenland as Dorset in origin were comparisons to material from Cape Dorset, published by Diamond Jenness. Eventually becoming aware of the relationship between site elevation and typological differences in the lithic material, his research would soon after result in the introduction of the Independence culture, divided into a phase I and II (Knuth 1954).

The new definition was symptomatic of a Paleo-Inuit archaeology where the development of a shared culture-historical terminology was never really a primary concern for researchers. Knuths own definition and conceptualisation of the Paleo-Inuit cultures in northernmost Greenland arguably represents a regional case of the ‘Dorset Problem’ in Eastern Arctic archaeology (Ryan 2016:761). While the veracity of Knuth’s definition of the two Independence cultures would soon be put to question (Collins 1958), it nonetheless remained until his death. The persistence of this definition has been explained by the monolithic position of Eigil Knuth in the regional research (Grønnow and Jensen 2003)—a position he maintained through his extensive fieldwork, peripheral position in the Danish archaeological community, and his frequent replacements of fieldwork personnel. The name of archaeological culture is likely no coincidence, signifying the independence of the regional prehistory as well as the independence of Knuth within archaeological research at his time.

Knuth argues that the two Independence cultures represented an isolated cultural development in Greenland. Based on the early radiocarbon dates and the abundance of muskox remains found in Northernmost Greenland, his thesis on the initial dispersal of these populations into the northernmost and north-eastern areas of Greenland would follow Steensby’s thesis of a Muskox Way (1917) through which pioneering populations entered Greenland during prehistory. According to Knuth, this initial movement preluded an independent development of Paleo-Inuit population isolated in the northernmost and north-eastern reaches of Greenland.

Despite his extensive documentation and collection of archaeological material in northernmost Greenland, Knuth never fully published his archive of archaeological finds and observations. In accordance to his will, this task was passed on to Bjarne Grønnow. Together with Jens Fog Jensen, a considerable effort was made to compile and catalogue Knuths archive, eventually be published in *“Northernmost Ruins of the Globe”* (Grønnow and Jensen 2003). The published catalogue places emphasis on presenting contextual information, predominantly focused on topographical and architectural information, site structure, artefact statistics, as well as radiocarbon dates (Grønnow and Jensen 2003:9). A total of 154 sites from Knuths archive are here presented, of which 23 have been designated to the Independence II/Greenlandic Dorset. While the publication does not feature detailed re-examination of lithic assemblages, it includes analyses of the faunal remains by Christyann Darwent (Grønnow and Jensen 2003:342-347).

To date, the most substantial effort at re-examining Knuths collections has been made by Mikkel Sørensen, in his thesis on the technological traditions of Greenlandic prehistory (see Chapter 2). Among sites from northernmost Greenland, the lithic assemblages of Vandfaldsnæs and Kap Holbæk—both recorded and collected by Knuth—were crucial for the re-definition of Independence II to the Greenlandic Dorset.

4.3. Current perspectives on the Greenlandic Dorset of Northernmost Greenland

Despite the recent acknowledgement of the Greenlandic Dorset in the archaeological record of Northernmost Greenland, its regional history remains shrouded in uncertainty. The two pivotal elements of how we understand the Greenlandic Dorset in this region are the techno-typological distinction of artefact assemblages as well as the quantity of collected artefacts from the period. Following the establishment of a regional Greenlandic Dorset by rigorous techno-typological distinction, it is arguably the ephemeral remains of artefacts from the period that now perplexes our understanding of its history.

Grønnow and Jensen have argued that the scarce quantity of lithic remains from regional Dorset sites indicate a regional occupation that would have been “extremely low and extremely brief (2003:339)”. This argument is predicated on quantitative comparisons between regions as well as culture-historical periods. The first comparison is between the total amount of lithics (1759) recorded among Greenlandic Dorset sites in Peary Land and adjacent regions and the number of lithics recorded (2523) from the exceptional Greenlandic Dorset site Kap Skt. Jacques on Ile de France in northeastern Greenland (see Chapter 5). The second comparison is between the number of lithics recorded from the Greenlandic Dorset occupation to the considerably larger number of lithics recorded from the preceding Independence I. There is no question that these comparisons demonstrate distinct spatiotemporal differences, both synchronously between the areas and diachronically between the culture-historical periods. However, these comparisons fall short of providing clues on the specific dynamics of Greenlandic Dorset living in Northernmost Greenland.

Most of the sites included in the present chapter features faunal assemblages, representing the relative abundance of faunal remains from the Greenlandic Dorset of northernmost Greenland. These assemblages provide valuable information of the Greenlandic Dorset economy in the region—not only on the variability of game species, but also seasonality. Most of the assemblages

are dominated by remains of muskoxen, as well as by large proportions of seal remains. Identifiable faunal remains from which seasonality has been inferred indicate that the Greenlandic Dorset of the region hunted their game during warm-season months. The abundance of muskox remains—as well as remains from fishing of char—suggests that the resource base in this area was predominantly terrestrial. Along the eastern parts of northernmost Greenland faunal assemblages indicate that the economy here was predominantly oriented towards a coastal resource base. Overall, the general patterns across the northern and north-eastern parts of Greenland are interpreted as indicative of a combined coastal- and terrestrial resource base. However, the degree to which these two areas are historically connected remains uncertain.

A key element to the understanding of the Greenlandic Dorset period in northernmost Greenland is the connection to the region with Ellesmere Island across the Nares strait (Grønnow and Jensen 2003:339). Technological similarities as well as similarities in lithic raw material use are strong indicators that people moving into northernmost Greenland arrived from the Nares Strait area. It is unclear if these people were among the first to enter Greenland at the onset of the period (see previous part), but it is clear that these were the first people since the Independence I period to live here.

The relationship between the sites in Peary Land and the coastal sites of north-eastern Greenland is based on observed patterns of lithic raw material utilisation and techno-typological similarities. Beyond the two geographic regions, a connection to the north-eastern area of Greenland is not excluded but marked differences in raw material utilisation suggests that the two areas represent two individual networks of movement. Sørensen continues this argument, modelling the range of these networks based on his interpretation of a Greenlandic Dorset embedded procurement of lithics and the observed raw material composition of Vandfaldsnæs and Kap Holbæk, together with the archaeological record of assemblages from Île de France. From this, Sørensen argues that the population of Greenlandic Dorset in Peary Land represents an eastward movement of people from Ellesmere Island that stopped somewhere near Nordostrundingen, while sites in northeastern Greenland represents a population moving from the southeast (Sørensen 2012:307).

Contrary to Knuth, Sørensen does not discuss in any length potential explanations regarding why Dorset groups eventually migrated into Greenland, nor any aspects concerning the diachronic

nature of their occupation. For now, the most recent and direct assessment of how groups of Greenlandic Dorset lived in the region has been made by Grønnow and Jensen:

“The Greenlandic Dorset [*sic*] occupation apparently never developed a complicated settlement system in central Peary Land including specialised camps and aggregation camps. Instead, the Greenlandic Dorset [*sic*] families appear to have roamed the area together. A few single family camps such as Genbonæs and Kap Harald Moltke show that a small social unit did occasionally split off in order to explore alternative hunting grounds” (2003:339).

With this re-assessment of the Dorset presence in northernmost Greenland, Knuth’s theory of the Independence-culture as an isolated development of Paleo-Inuit prehistory was refuted. However, the assessment does not theorise why groups of people were motivated into the extreme environment of Peary Land and adjacent region.

From the current perspective of the Greenlandic Dorset in northernmost Greenland, the current regional understanding is predominantly that of recognition rather than understanding. As discussed in Chapter 2, this is largely due to the prevalent tradition of Eastern Arctic research to continuously pursue more nuanced or even replacing extant definitions of geographically and culture-historically distinct archaeological cultures. While by far not the case for many areas of present Eastern Arctic archaeology, the Greenlandic Dorset of northernmost Greenland arguably represents among the most poorly understood periods of Eastern Arctic prehistory. However, what we can already understand is that the period of human occupation in the region during the period was highly brief and expansive. Furthermore, the excellent conditions of preservation provide important insight into the subsistence and resource-management of people at the time. Still, lithic assemblages constitute the most abundant material record from the period. This case-study will look closer into how lithic materialities contributed to the formation of the unique archaeology of the region. The main question that will be answered here is as follows: **How did lithic materialities support people’s capacity for expansive movements into northernmost Greenland?**

4.4. Re-assembling the Greenlandic Dorset of Northernmost Greenland

During a three-week research stay at the NKA – National Museum of Greenland, five assemblages from northernmost Greenland were analysed. The assemblages include Engnæs, Hvalterrasserne, Kap Mylius-Erichsen, Kap Harald Moltke, and Vandfaldsnes. The site Kap Holbæk, curated by the National Museum of Denmark, was also included into the regional analysis after a two-week research stay at the museum.

Each assemblage is introduced with a general site description where relevant contextual information is reviewed. These descriptions mainly derives from the comprehensive compilation and summary of Knuths archaeological archive from northernmost Greenland made by Grønnow and Jensen (2003). Unlike the assemblages included in the present study from Qeqertarsuup Nuua, several of the sites in this chapter have not been previously subjected to technological analysis. As such, my own analysis must be compared to general descriptions and observations made either by Knuth or by Grønnow and Jensen.

Although the High Arctic environment makes excellent conditions for material preservation, the archival taphonomy is particularly pronounced when examining lithic assemblages collected in the region. This is primarily due to fieldwork methodology applied during their collection.

While the sites included in the previous chapter were excavated and catalogued with a developed, standardised excavation methodology, the assemblages in this chapter were collected firmly within the unconventional excavation methodology of Knuth (Grønnow and Jensen 2003:31). Consequently, information regarding spatial layout of artefacts is highly approximate, i.e. the artefacts are designated to site features and groups that are often vaguely defined. Fortunately, the potential for qualitative considerations and analysis is to a degree remedied by small sizes of lithic assemblages from the region.

An immensely useful resource for the present analyses is the compiled database of artefacts collected by Knuth that was provided by the National Museum in Nuuk. This database is a digital spreadsheet of Knuths own artefact inventories, including notes. Most artefacts in Knuth's collections have been given individual identification numbers. This is highly fortuitous as it allows re-definitions of individual specimens without detriment to the integrity of the original assemblages. The only exception is the identification of flake material, whereby groups of flake

material from individual features are given a shared ID number. Only on a few occasions have this been an issue when flakes were identified as other lithic types.

Ambiguously recorded site layouts are a prevalent issue when examining lithic assemblages from the region. This is primarily a consequence of the fieldwork methodology employed by Knuth. Site layouts described by Knuth usually involves several features, often divided into groups. Features generally refer to structural remains often termed dwellings or ruins, including mid-passages, tent rings, hearths, etc. The features and groups are often spread out across considerably large and distinct areas, typically delineated by topography—e.g., a cape (Danish: *kap*), point, (Danish: *næs*), terrace (Danish: *terrasse*), or an island (Danish: *Ø*).

I will now present my analyses of lithic assemblages from the region. The material presented here constitutes a significant part of the available archaeological material collected from Peary Land and adjacent areas. The presentation of my analyses provides the first comprehensive empirical examination of Eigil Knuths archaeological collections.

4.4.1. *Engnæs*

From west to east, Engnæs (Meadow Headland) is the first Greenlandic Dorset site as one enters the regions of northernmost Greenland. The distance from the nearest relatable sites found on Northern Ellesmere Island is considerable, leaving a remarkably large area without a presence of Dorset sites (Grønnow and Jensen 2003:338). Until new discoveries of Dorset sites in this area are made, Engnæs will represent the westernmost periphery of the archaeological record of Greenlandic Dorset in Northernmost Greenland. The assemblage from the site is one of two sites in the region including more than 100 lithic artefacts, as well as featuring almost every category of lithic artefact type known from the Greenlandic Dorset. Several artefacts of organic material were also collected from the site area, including bone needles, worked bones, harpoon heads, muskox teeth pendants,

The site is located at the western entrance into Wandel Dal, at the bend of an alluvial fan on the southern shore of Øvre Midsommersø. Nine dwellings and two ‘exterior’ features were documented by Knuth during fieldwork at the site in 1968. Scarce information of the site layout is available as Knuth never produced a site map. Based on the available documentation—describing features separated by several hundred metres—it is possible the site represents several episodes of

occupation. Comprehensive descriptions of each site feature can be found in (Grønnow and Jensen 2003:69-74), but a brief summarisation is in order.

The largest artefact assemblages were collected from Feature 4 and 5. The most distinct dwelling structures at Engnæs are features 1 and 4, both defined as mid-passage dwellings. The available radiocarbon dates from Engnæs were collected from Feature 1 and 4. The two samples from Feature 1 were from charcoal, while the sample from Feature 4 was obtained from a muskox bone. The significant deviation between the two dates obtained from Feature 1 (2610 ± 100 and 3080 ± 100) has added some degree of uncertainty to the definition of the site as strictly Dorset, as the latter dating is older than the typical Greenlandic Dorset dates. Grønnow and Jensen argues that the likely reason for such a deviation is the contamination by ancient driftwood mixed into the firewood burned at the site. The sample of muskox bone from Feature 4 yielded a dating 2350 ± 70 (calibrated to 760-250 cal. BC).

Feature 1 was provided a more detailed description by Knuth due to the unconventional positioning of its southern-facing entrance perpendicular to the east-west oriented mid-passage of flagstones (Grønnow and Jensen 2003:69). Knuth also attempted some degree of dwelling reconstruction by moving flagstones into their assumed original positions, but without first documenting their *in situ* positions during excavation. The photos and drawing of the dwelling were made only after the reconstruction. It is therefore impossible to assess if the unusual layout of the dwelling was due to previous site disturbances, or that it is in fact an unconventional Dorset mid-passage structure. The age discrepancy between the two available datings from the feature leaves open the potential that the site was originally used during the Independence I before being re-used and disturbed people during the Greenlandic Dorset period (Grønnow and Jensen 2003:70-71). In regards the number of artefacts collected, the catalogued inventory of feature 1 lists only 9 artefact findings.

Feature 4 has been described as a slightly disturbed mid-passage dwelling from the Greenlandic Dorset period. It is located nearby feature 3 to the south-east. A defining characteristic of the dwelling is the box hearth of thick flagstones embedded into a mid-passage of flat stones. While the box is not documented on photographs and drawings, the mid-passage is described as 3 metres long and 0.6 meters wide, built of flagstones. The dwelling periphery is heavily disturbed. A meat cache was also identified at the western side of the mid-passage. It is unclear if the large muskoxen vertebrae found in anatomical order by Knuth inside the mid-passage and along its

western side were discarded in the mid-passage or the cache. A total of 136 lithic artefacts were collected at feature 4, as well as two harpoon heads, three needles, and several pieces of worked bone.

The modest structural remains of feature 5 consists of a flagstone scatter located on a small gravel bank. The defined area at ca. 2 x 2 m is covered by fragmented flagstones, with a few boulders at its periphery. A few flagstones in the middle of the area have been vertically placed at right angles towards each other. Numerous bone splinters and a few pieces of charcoal was spread out around the area. In addition to the 135 catalogued lithic finds, needles and needle fragments were also collected. The faunal material is mostly comprised by arctic char and otherwise unidentified fish remains (81%), as well as the deciduous molar of a muskox younger than six months of age and a few lemmings remains.

The structural remains of features 2, 3, and 6-10 have only allowed tentative definition. Among these sites are included caches and hearths, boulder structures, flagstone pavements and scatters, as well as tent rings with or without a central hearth. Only a limited number of lithic artefacts were collected from these features, the inventory listing a total of 11 findings.

Faunal material was collected from features 1, 3, and 5. Muskox remains were recorded but not collected from features 4 and 7. The identified species include arctic char, muskox, and collared lemmings. Additional faunal remains include fish remains and a few pieces of unidentified species. Examination of the muskox molar collected at feature 5 has identified it as an animal less than six months old, indicating that it died during summer.

Among the lithic artefact categories identified in the present analysis are flakes, microblades, endscrapers, bifaces, adzes, and preforms (Table 11). See part 8.1., Appendix A for comprehensive descriptions, and part 11.1., Appendix E for artefact illustrations.

The raw material composition of the lithic assemblage is highly homogenous and represents the raw material availability of blue-grey MCQ and black dolerite in the general region (Table 11). The flake material clearly demonstrates this (8.1.6.). Most of the flakes have been removed from nodules of blue-grey MCQ. Their relatively large sizes indicate early stages of lithic production having occurred on site. This interpretation is bolstered by several successful refits of corticated flakes of both MCQ and dolerite.

A total of 12 microblades were examined (8.1.3.). The microblades of the lithic assemblage are assumed to be of shared geological provenance, judging from the identified raw material types.

Table 11: Lithic types and raw materials identified in the assemblage from Engnæs.

Engnæs	Microblades	Endblades	Endscrapers	Adzes	Preforms	Retouched flakes	Flakes	SUM
MCQ								
Blue-grey	8	4	1		3	4	265	285
Grey		1					1	2
Light grey	1	1					1	3
Brown-grey	2							2
Light brown	1						1	2
Black							2	2
Burned							1	1
Dolerite								
Black				1			3	4
SUM	12	6	1	1	3	4	274	301

An absence of short proximal and distal fragments is notable, although this might be the result of a lack of sieving during excavation. The lack of other artefacts associated with microblade production (i.e. cores and preparation flakes) makes it conceivable that the presence of microblades at Engnæs is the result of replacing blade components for knives either by skilful and effective microblade removals on-site from highly prepared cores, or that finished microblades had been transported to the site. As such, the evidence of primary stages of lithic production provided by the flake material is not related to microblade production.

Six endblades were identified in the present analysis (8.1.1.). Endblade specimens from Engnæs are exclusively made from blue-grey/grey types of MCQ. Specimens with an intact distal edge are the only ones that indicate original morphology. Both distal and proximal specimens exhibit a distinctly characteristic fragmentation with a diagonal fracture having occurred right above the basal area. The fact that no fragmented specimens could be refitted suggests that the presence of endblade specimens in the Engnæs site assemblage is due to the replacement and discard of broken tool components.

Traces of endblade production inferred from flakes (Table 12) and preforms suggests that endblade production also occurred on-site, where successfully crafted specimens were subsequently transported away. Furthermore, the presence of a failed endblade preform supports the interpretation that raw material procurement occurred in areas adjacent to Engnæs (8.1.5.). Also, judging from the relatively large amount of remaining raw material mass, the fact that no further attempt at knapping were performed on the preform fragments suggests that the occupants at Engnæs were in a situation of lithic raw material abundance.

120 Journeys along the Muskox Way

Table 12: General size measurements and raw material composition of examined flake debitage from Engnæs.

Engnæs	0-1 cm ²	1-2 cm ²	2-3 cm ²	3-4 cm ²	4-5 cm ²	5-6 cm ²	SUM
MCQ							
Blue-grey	87	150	25	1	1	1	265
Grey		1					1
Light grey	1						1
Light brown	1						1
Black		2					2
Burned		1					1
Dolerite							
Black		3					3
SUM	89	157	25	1	1	1	274

The single adze specimen of black dolerite (8.1.4.) further indicates a situation of raw material abundance, considering the large size of the artefact. Traces of distal polish suggests that the component was deposited at the site after some degree of use. Refitted flakes of dolerite from the site assemblage are evidence of on-site production of a dolerite tool component, assumed to be an adze. It is therefore conceivable that the complete adze specimen was brought on-site where it was discarded and replaced by a new dolerite component that was finished on-site following previous preparations or made from a recently procured nodule prepared by a few expedient removals—as indicated by the high amount of cortex on the refitted flakes.

Summary

The lithic assemblage collected from Engnæs suggests episodes of tool kit maintenance primarily by component replacements and rejuvenation, in addition to early stages of preform preparation and nodule testing. Early stages of production can be discerned from material related to adze and endblade component production, with evidence of a successful production of an adze that was brought off-site, and the failed production of an endblade. The few, related specimens of dolerite flakes indicate that a single episode of adze component preparation occurred during the occupation of the site. Flake material of MCQ, most notably the refitted flakes with cortex, are indicative of knapping procedures at the earliest stages of component preform production. The deposit of these remains along with the large fragments of a preform endblade points to an event where large

nodules of blue-grey MCQ was brought to the site for early-stage preparation of preforms for endblade component production.

From these observations, the lithic deposition at Engnæs can be inferred as having been formed by events that followed recent procurements of raw material into highly prepared tool kit supplies. While a few new components were produced on site, replacements were predominantly made with prepared components kept in supply. Lithic production primarily pertained to the testing and initial preparation of preforms that would later become involved in tool kit preparations.

4.4.2. Vandfaldsnæs

Vandfaldsnæs (Waterfall Point) is a large, multi-component site with remains from Independence I, Dorset, and Thule. The site is made up by numerous features spread out across several terraces on a rounded point delimited by the river Arkæolog Elv (Archaeologist River) to the west, while its ancient gravel terraces form a point of entry from its hinterland (Figure 11). The topography of the area is an excellent example of the effects of post-glacial rebound. These effects helped Knuth establish a local chronology of site settlements—each phase situated on distinct terraces, from oldest at the highest elevation to youngest at the lowest. The archaeological features (re)defined as Dorset at the site are located at 5-6,5 m.a.s.l, on ‘Terrace 3’. Knuth here described a total of twelve features (6-14). The detail of description varies among the features, and as such there are ambiguities regarding their exact location and definition. The three best described features are feature 9, 10, and 11, all defined as tent rings. A summarisation of the three features will follow below. Among the other (vaguely) defined feature types at Terrace 3 are open-air hearths, irregular

Figure 11: Site map over Vandfaldsnæs drawn by Knuth (Grønnow and Jensen 2003:140).

boulder structure, 'rectangular ring of tightly packed boulders and flagstones', flagstone pavement, and boulder periphery.

The site structure of feature 9 is made up of a boulder periphery set in a rudimentary rectangular order. The feature was excavated on two separate visits, which is here considered the likely reason for a division between a feature '9' and '9a' that has not been explained. The site assemblage of feature 9 is characteristic for its relatively rich inventory of organic artefacts with only a limited assemblage of lithic artefacts, numbering only 17 listed artefacts. Recorded organic artefacts include harpoon heads, needles, a fragmented cloven-hoof lance, muskox teeth pendants, a birch bark roll and wood pins.

Feature 10 is described as a small (1,5 x 2,7 m) oval flagstone periphery located 30 paces east of feature 9 and 14 paces from the edge of the terrace. Both organic and lithic artefacts were collected from the site during two visits. Organic artefacts include a needle, two flint flakes, and a curious bone pin with an oval hole in the middle—interpreted by Knuth as a possible gull, wolf hook, or a needle preform. A total of 16 recorded lithic artefacts were collected. The documentation of a feature 10b is only referred to in the cataloguing of three end scrapers, but it is not mentioned elsewhere. As such, the division between area 10a and 10b is given no regard in the present analysis.

Feature 11 is located 18 paces east of feature 10 and 18 paces from the edge of the terrace. It is described as a rudimentary periphery of smaller stones and flags. During several visits, a large assemblage of lithic and organic artefacts was collected from the site. The majority of findings were collected from within the tent ring, defined as 11a, while the remaining artefacts were collected from the vaguely defined outdoor area 11b. Organic artefacts include needles, a wood peg, a flint flaker, and worked bone. 298 lithic artefacts were recorded from 11a, while 96 were recorded from 11b.

Radiocarbon datings were sampled from features 9 and 11. Dating samples from feature 9 included driftwood and muskox bone. Calibrated within one standard deviation, the samples yielded dates at 1610-1310 cal. BC, 1000-800 cal. BC and 760-380 cal. BC. The oldest date was obtained from the piece of driftwood, and its deviating age is considered illustrative of the unreliability of driftwood for dating. Only a single dating is available from feature 11, obtained from a muskox bone. Its calibrated date, within one standard deviation, is 820-540 cal. BC.

Examinations of the faunal material from feature 9 has indicated the site as a summer occupation, inferred primarily from the high frequency of fish and bird remains. Additionally, remains of hare, fox, seal, and muskox were collected. By measuring minimum number of individuals (MNI) the species are represented by the following amounts: one char, one cod, one duck, four geese, two ptarmigans, two seals, one hare, one fox, and one muskox. Identified species among the ten bone fragments collected from feature 10 include fish (char and an unidentified species), seal, and muskox, where the presence of fish and seal is considered a tentative indicator of summer occupation. Faunal remains from feature 11 are dominated by fragments of seal bone, followed by fish, muskox, bird, and hare, with a minimum of a single individual per species represented. As with feature 9 and 10, the faunal material from feature 11 is considered indicative of warm season occupation. The labelling of the faunal collections from the earliest excavation at Vandfaldsnæs in 1950 as “Dorset Slottet” (The Dorset Castle) is a small novelty of research history – a relic of Knuths earlier understanding and definitions prior to his definition of the Independence cultures (Grønnow and Jensen 2003:143).

The artefact assemblage collected from the Greenlandic Dorset features at Vandfaldsnæs is among the largest recorded in northernmost Greenland. 429 lithic artefacts have been recorded from the site, along with numerous organic artefacts. The assemblage of lithic artefacts has previously been analysed by Sørensen (Sørensen 2012:227). From the fact that the lithic assemblage from Vandfaldsnæs was a prominent element in the emergence of the Greenlandic Dorset definition (Grønnow and Sørensen 2006; Sørensen 2012), it holds a status as a type assemblage. Lithic types examined in the present analysis include flakes, microblades, adzes, endblades, endscrapers, burin-like tools, and a possible sidescraper (Table 13). See part 8.2, Appendix B for comprehensive descriptions, and part 11.2., Appendix E for artefact illustrations.

The assemblage of twenty microblades collected at Vandfaldsnæs is highly homogenous, both in terms of raw material type and technological characteristics. 11 of the microblades were intact. None of the fragmented specimens could be refitted. However, dorsal-to-ventral refits were achieved. One microblade knife specimen of grey colour (L1. 7598) and a microblade preparation blade specimen (L1. 7608) were refitted. Found separately at the dubiously distinguished site features 9 and 9a, the refit is evidence of contemporaneity between the features as well as on-site events of microblade knapping during the site occupation.

Table 13: Lithic types and raw materials identified in the assemblage from Vandfaldsnæs.

Vandfaldsnæs	Microblades	Microblade cores	Endblades	Endscrapers	Sidescraper	Burin-like tools	Adzes	Preforms	Retouched flakes	Flakes	SUM
MCQ											
White			2								2
Blue-grey	7	1	3	4					1	78	94
Grey	8					2			1	2	13
Light grey	5									20	25
Light brown			1								1
Red-brown			1								1
Black					1	1				4	6
Dolerite											
Black							2	1		61	64
SUM	20	1	7	4	1	3	2	1	2	165	206

A single microblade core specimen (8.2.6.) was identified in the lithic assemblage from Vandfaldsnæs. The core exhibits a unique cylindrical morphology with opposing negative removals on its single front. The platforms are small and faceted, but it is possible that the specimen is a fragment of a larger core. The irregular removal scars on its ventral side makes any clear assessment regarding its fragmentation impossible. The presence of another microblade core during the site occupation is indicated by two large flakes of blue-grey MCQ identified as distal rejuvenation removals, indicating an episode of core rejuvenation at feature 11.

A total of 9 endscrapers were identified during the analysis (8.2.2.). These exhibits shared technological characteristics: Asymmetrically flared edges with an emphasised right dorsal corner made by a rounded notch, and bifacial knapping with ventral removals predominantly in the proximal area. The most notable variation is observed in artefact sizes, as well as the degree of edge flaring.

The characteristically flared edges are consistent among all nine specimens. Among the largest specimens is L1.7610, collected from feature 9. It is made from a large flake removal, shaped to feature a distinctly broad, convex front edge and a carefully rounded base. The flared edges are prominent, with a relatively large mass featured above the presumed hafting base. Judging from the precise, unifacial removals, the specimen is a finished component that was hafted prior to deposition.

Four specimens categorised as burin-like tools were identified in the assemblage (8.2.4.). Two of these are typologically distinct by their retained distal areas with traits including polished

Table 14: General size measurements and raw material composition of examined flake debitage from Vandfaldsnæs.

Vandfaldsnæs	0-1 cm ²	1-2 cm ²	2-3 cm ²	3-4 cm ²	4-5 cm ²	SUM
MCQ						
Blue-grey	40	37	1			78
Grey	1	1				2
Light grey	11	9				20
Black		3	1			4
Dolerite						
Black	10	40	9	1	1	61
SUM	62	90	11	1	1	165

surface and a generic burin-like tool morphology with a steeply angled ‘working edge’ at the left dorsal side. The categorisation of the remaining specimens is, however, less confident.

Seven specimens were classified as lithic endblade components. The specimens are all fragmented, including three distal and four proximal specimens, none of which could be refitted. Some variability in raw material composition is observed, with MCQ types including three specimens of the common blue-grey/grey type, two of a translucent white type, a light brown specimen, and a red-brown specimen.

MCQ of the translucent white type has not been observed in other Greenlandic Dorset assemblages from within the Wandel Dal/Jørgen Brønlund area. A similar type has only been identified at Kap Holbæk. The raw material colour of the two brown types may be the result of patination. Diagonal fragmentation is frequently observed in the lithic assemblage, as is commonly seen among the other regional lithic assemblages. The fragmentation has most often occurred just above the proximal base, suggesting fragmentation during use.

The absence of associated fragments indicate that the collected specimens were once discarded at site after being brought to the site following use elsewhere.

Two fragments of a single dolerite adze component were identified in the assemblage, collected from feature 11. The presence of 51 dolerite flakes at the same feature (Table 14), of which two large flakes were refitted, indicate that production and/or rejuvenation of lithic adze components occurred at the site. Attempts at refitting flake material with the adze specimen were made, but none were successful. The generally large size of the dolerite flakes suggests that nodules for adze production was locally procured, brought on site to be knapped, and subsequently transported away. Four large dolerite specimens were collected from feature 9a, suggesting an

episode of raw material testing at the site—in turn corroborating the interpretation of a local raw material procurement. In this regard, it is inferred that the single adze specimen was deposited during component replacement.

Summary

The present analysis of the Vandfaldsnæs assemblage has indicated the temporalities of a broad range of site activities. In general, these involve lithic production, component rejuvenation, as well as the replacement of broken or otherwise redundant components.

Lithic production was primarily made from highly prepared microblade cores and nodules. Subsequently, people left the site with better prepared composite tools and tool kit supplies. The deposition of lithic material associated with microblade and bifacial component technologies was the result of far more structured circulation. This indicates that such technologies were far more curated while the site occupants moved through northernmost Greenland.

The exception is the patterns observed among lithic artefacts associated with the production of adzes, which indicate that dolerite nodules had been more recently procured. Furthermore, these artefacts indicate that the deposited adzes had been produced with much more expediency relative to other component technologies.

These patterns not only point to how lithic depositions at the site was highly contingent on earlier tool kit preparations, but that these people continuously adjusted their tool maintenance and tool kit preparations to availability and properties of resources in the new landscapes that they moved into.

4.4.3. *Kap Harald Moltke*

The collection of artefacts Kap Harald Moltke represent one of the most ambiguous Greenlandic Dorset site assemblages from the northernmost part of Greenland. The site itself is located at the tip the southern point of the Kap Moltke Peninsula in Jørgen Brønlund Fjord, opposite the islet of Dråbeholmen (Drop Islet). Knuth here identified the remains of both Independence I and II among several artefact scatters and rudimentary site structures. Although a site map distinguishing individual site features was never produced, the separation between features of Independence I and II at Kap Harald Moltke have followed the elevation above sea level. As such, the features situated at ca. 13,5 m a.s.l were registered as Group Ia and Ib, two structures designated to the Independence

I, while the site of Group II was designated to the Independence II. Group II is located at ca. 9,5 m a.s.l, described as a boulder ellipse.

The obscure site assemblage leaves much to speculation. Despite this, the analysis of the assemblage has been highly informative. Identified lithic artefact categories in the site assemblage include flakes, preforms, microblades, endblades, sideblades, microblade cores, and end scrapers (Table 15). See part 8.3., Appendix B for comprehensive descriptions, and part 11.3., Appendix E for artefact illustrations.

The assemblage of artefacts related to microblade technology from Kap Harald Moltke is notable by the presence of microblade cores and the absence of microblades. Only a single specimen was tentatively identified as a microblade preparation blade. The four microblade cores from Kap Harald Moltke are varied in raw material type, size, morphology, and technological characteristics (8.3.5.).

Specimen L1.7464 has a highly distinct keel-shaped morphology with a single front. The general core platform is plain, with only a few minor flake removals on the front edge of the refitted rejuvenation flake. In its earliest stages of shaping, the platform and the rounded, keel-shaped morphology suggests that it was a detached fragment of a large adze- or wedge-like nodule. Whether the rounded keel of the core was shaped prior or after the fragmentation is uncertain, however. The keel could have been shaped to accommodate a holding device for pressure-flaking, although no other core specimen identified in investigated assemblages share its distinct morphology.

Another notable characteristic of specimen L1. 7464 is the large rejuvenation flake that has previously been permanently refitted with glue to the core platform. Fortunately, the refit appears

Table 15: Lithic types and raw materials identified in the assemblage from Kap Harald Moltke.

							Microblade	Retouched		
MCQ										
Blue-grey		1		1				3		5
Light grey						2		1	1	4
Brown-grey (spotted)						1				1
Brown-grey (banded)						1				1
Brown-grey			1							1
Light brown	1			1			2			4
Black							2			2
Dolerite										
Black					1					1
SUM	1	1	1	2	1	4	4	4	1	19

to have done little to detriment the observable technological attributes of the core. Despite the permanence of the refit, it clearly indicates an event of microblade core preparation, following a hinged removal. The new platform features some small scars that indicate continuous shaping of the platform after the large removal. However, following these removals the core was discarded without any apparent attempts at continued microblade removal.

Specimen L1.9840 is another unique microblade core from Kap Harald Moltke. It is a large specimen of high quality black MCQ with remains of cortex at its back. The core features a single platform with multiple platform removal scars. Its single front has a $\sim 80^\circ$ platform-to-front angle and features six relatively large and highly regular blade removal scars. The distal area of the specimen has been reduced by a single large removal, indicating the employed method of knapping where distal shaping of the core was performed to achieve a desirable core morphology (and possibly a desirable microblade morphology).

The surplus of mass and lack of visible knapping errors (which could have been the motivation behind the distal removal) indicates that the core was discarded in a state suitable for further production of microblades. It is therefore considered likely that the specimen is a cached artefact.

The third microblade core specimen, L1.9841, is made from a similar black MCQ type as L1.9840. Its general morphology is also similar, but its technological characteristics are in stark contrast. While the initial preparation removals were successful, subsequent removals have been poorly executed. No apparent flaws in the raw material can be observed, and it is therefore conceivable that the irregular removals and knapping errors were made by a knapper of low skill—potentially an inexperienced knapper.

Specimen L1.7463, made from a grey type of MCQ, is highly resemblant to L1.9840 in morphology and technological attributes. The platform is prepared with a few, larger removals, and the platform-to-front angle is relatively low, at around $\sim 70^\circ$. The single-front removals are highly regular, with no removal terminations visible to indicate any knapping errors prior to deposit. This is a result of the large removal made at the distal area of the microblade core, distinctly resemblant to specimen L1.9840.

The site assemblage includes two endscrapers labelled L1.9831 and L1.7462 (8.3.2.). The technological characteristics of L1.9831 are typical among endscrapers from the regional period, including the notable curved notch on its right dorsal side. It is among the smallest specimens of

its type identified in the assemblages from northernmost Greenland, measuring l: 18; w: 23,6; t: 5,7 mm. Its relative measurements indicate that the component had previously been rejuvenated., thus indicating a prolonged circulation as part of a composite tool.

Specimen L1.7462 is on the opposite end of the size spectrum being among the largest endscraper specimens identified among the regional assemblages, measuring l: 46,5; w: 41,1; t: 8 mm. The morphology of the endscraper is similar to the original size of its preform stage. As such, it was likely procured, shaped, used, and eventually deposited within a relatively shorter timeframe. Considering the potential variability of endscraper utilisation discussed in the previous chapter, the specific purpose of the component may have become redundant and thus prompting its deposit by replacement of another component.

A single fragmented sideblade was identified in the Kap Harald Moltke site assemblage (8.3.4.). Unlike the sideblade specimen identified in the Kap Holbæk assemblage, no associable remains of a cloven-hoof lances are available. Its deposition suggests an event of component replacement for a cloven-hoof lance.

A single specimen was categorised as flake debitage (8.3.7.), while four artefacts were categorised as large flakes/preforms (8.3.6.). Three of the large flakes were made from the common blue-grey/grey type. Two large flakes were refitted, indicating that they had been recently procured and subsequently tested during the site occupation. The generally large size of the flake material suggests a recent event of raw material procurement. Based on their size and the apparently high-quality raw material, it is conceivable that these artefacts were deposited in situations of abundant raw material availability or as a caching for future visits to the site.

Summary

The analysis of the lithic assemblage from Kap Harald Moltke emphatically indicate that sequences of lithic production hardly took place during its site occupation. Rather, the lithic deposition was primarily formed by a few events of composite tool maintenance and attempts at curating tool kit supplies. The latter is demonstrated by the microblade cores.

These have indicated how people had transported highly prepared lithics in supply, which likely had circulated over considerable distances and numerous events of microblade production prior to their deposition. Why these were deposited is a dubious question but considering that each would have easily provided sufficient raw material for further production suggests an event of

caching. Regardless, the fact that people would leave the objects behind indicates that the site occupants were already supplied with numerous highly prepared microblade cores, and that the general availability of lithic raw material in the region was abundant. A conceivable scenario is that after moving across the regional landscape, people had become sufficiently acquainted to the availability of viable lithic raw material to discard previously supplied lithics.

4.4.4. *Kap Mylius-Erichsen*

In the south-western junction between the Jørgen Brønlund Fjord and the Independence Fjord lies a low headland named Kap Mylius-Erichsen, named after the leader of the Denmark Expedition of 1906-1908. The topography of the site is defined by a gravel plateau at around 5 m a.s.l, and a stone filled point reaching about 7 m a.s.l. From the point the terrain drops into a series of narrow boulder-strewn terraces (Figure 13). A total of 7 features were identified as Greenlandic Dorset (Independence II) at the site. Features 8-

Figure 12: Kap Mylius-Erichsen, Feature 3. From (Grønnow and Jensen 2003:155).

12 have been categorised as Thule sites, although their locations suggest that they may have been previously occupied by Dorset people. The location of each feature can be seen in the hand-drawn map originally made by Knuth (Figure 13). By number of features, the site is among the largest Greenlandic Dorset sites recorded in northernmost Greenland.

The identified types of features include mid-passage dwellings (feature 1a and b, 5, and 6); flagstone pavements (feature 2, 4a and b, 8, 10, and 11), boulder structure (feature 12), hearth with boulder structure (feature 3a), open-air hearths (feature 3b, 4c), and a possible cache (feature 9). These features are widely dispersed across the cape, forming well-defined groups that suggests several episodes or contemporary groups of occupation. Features 1 and 2, 3-5, and features 6 and 7 each represent individual groups of dwellings with nearby outdoor hearths and activity areas. Together with features 8-12, a total of four episodes of site occupation has been estimated (Grønnow and Jensen 2003:159). All the features identified at Kap Mylius-Erichsen have likely

been disturbed by cryoturbation. A novel characteristic of Feature 7 are the distinct, black boulders that makes the tent ring periphery.

Despite the large size of the site, only a few artefacts were collected. The total amount of inventoried lithic artefacts collected from the site numbers only 23. The scarce number of lithic artefacts is noteworthy as it is seemingly not for a lack of material collection. In addition to the lithic objects, Knuth collected organic artefacts of bone, teeth, and wood, as well as an abundance of faunal remains. The recorded categories of organic artefacts include needles and needle fragments, a harpoon head, birch bark rolls, wood pegs, muskox teeth, and worked bones such as bone pins, bone points with lashing, and bone splinters.

Faunal material was collected from each site group. Most of the faunal material have not allowed for species identification, but identified species include muskox, seal, hare, arctic fox, fish, and bird. A relative abundance of muskox remains has been recorded at almost every site feature. Feature 1b is an exception with its dominance of fish bones. Seals are the second most common species identified among the features. Overall, the faunal remains at each site feature represents

Kap Mylius-Erichsen

Figure 13: Knuth's hand drawn site map of Kap Mylius-Erichsen. From (Grønnow and Jensen 2003:155).

only a few individual animals. The faunal remains also indicate that the episodes of occupation at the site during the Greenlandic Dorset period occurred during the summer season. The most tenable evidence for this is the remains of juvenile bird bones from birds hunted during the breeding season in the late spring/early summer. The fish remains are also suggested to be have been left behind during the summer when conditions are more favourable for this type of marine exploitation.

Despite its small size, the collected lithic assemblage display characteristics sufficiently distinct to allow a confident assessment of its cultural provenance as Greenlandic Dorset. Furthermore, the assemblage has provided valuable observations for inferring the historical contingencies of the Dorset materiality. The lithic assemblage includes microblades, endblades, a sideblade, and endscrapers (Table 16). See part 8.4., Appendix B for comprehensive descriptions, and part 11.4., Appendix E for artefact illustrations.

The eleven microblades in the assemblage (8.4.4.) were collected from five of the features: Two specimens were collected from 1a and 1b respectively; two specimens from 5; four from 6; and three from 7. A single specimen was collected from an unspecified area. Most specimens are made from blue-grey/grey MCQ, except for two specimens categorised as dark brown MCQ. The two dark brown specimens have been previously refitted (Owen 1983), providing evidence of a contemporaneous occupation between features 5 and 6 and feature groups 6-7 and 4-5.

Two lithic artefacts in the assemblage were categorised as endscrapers (8.4.2.). Both specimens have been collected from feature 5 and would have been deposited following component replacement. A specimen of grey MCQ was defined as a ‘typical’ Greenlandic Dorset endscraper with a single flared edge. The specimen made from a quartzite-like material was only tentatively categorised as an endscraper. The most distinct characteristic of the grey MCQ specimen (L1.9734)

Table 16: Lithic types and raw materials identified in the assemblage from Kap Mylius-Erichsen.

Kap Mylius-Erichsen	Microblades	Endblades	Sideblades	Endscrapers	Retouched flakes	Flakes	SUM
MCQ							
Blue-grey	5	1			1		7
Light grey	4		1	1		3	9
Dark brown	2						2
Green		1					1
Black		1					1
Quartzite							
White				1			1
SUM	11	3	1	2	1	3	21

is the flared corner on its right dorsal side. When examining the removals that shaped the corner, a series of delicate and steeply angled removals can be observed, which contrasts the low angle removals on the opposite side. Furthermore, the removal angle on the right side is identical to the front edge.

Each of the three examined endblade specimens exhibits notable characteristic but are all indicative of component replacement during tool kit maintenance (8.4.1.). A small fragment of a green type of MCQ that is not known to the region suggests that the object had previously been procured, produced, and circulated outside of the region. A single specimen previously categorised as an endblade was identified as a sideblade (8.4.3.), indicating the maintenance of a cloven-hoof lance.

Summary

The lithic site assemblage from Kap Mylius-Erichsen is best understood as deposits following brief episodes of tool kit maintenance. The available lithic specimens from the site suggests that these are primarily the remains of lithic component replacements with components prepared and transported from elsewhere. A notable absence of flake material suggests the absence of lithic production at the site. However, the available microblade specimens have through refitting revealed that some degree of contemporaneous component production took place between two separate areas of the site. Furthermore, it suggests that more than one person was involved in choosing which specimens were to be left behind on site after production, and which were to be transported off-site.

Comparably, the scarce amount of lithic contra organic material demonstrates how the deposit of lithic artefacts during the Greenlandic Dorset cannot by itself be treated as a marker of how intensely a site was in use. Considering the relatively abundant remains of organic artefacts and faunal remains compels an appreciation of the broader range of actors and activities involved during site occupations during the period. Thus, the Kap Mylius-Erichsen site assemblage emphasise how scarce lithic depositions does not necessarily imply minimal site activity. Rather, it is likely that the deposit of the site assemblage here proceeded tool kit preparation elsewhere, that absolved the need for lithic component production.

4.4.5. Hvalterrasserne

The objects collected at Hvalterrasserne represents the northernmost archaeological record of the Dorset period. The site is located by a south-eastern facing slope in the small east-west oriented Midgård (Midgard) valley, which branches off the northern shore of Frigg Fjord. It features three ruins, two of which are described as well-preserved mid-passage dwelling (feature A and C), and the third as a flagstone pavement at the foot of a large boulder (Grønnow and Jensen 2003:223). Only the two mid-passage ruins have been excavated. A small number of artefacts were identified within the excavated mid-passage ruins, while most findings were collected from an outdoor activity area 4-5 meters away from feature C. The two ruins have been interpreted as the dwelling remains of two families visiting the area (Grønnow and Jensen 2003:225).

In the general vicinity of Hvalterrasserne, an abundance of easily accessible raw material was observed during fieldwork. This observation has important implications for the present analysis of the Hvalterrasserne site assemblage, calling for serious consideration regarding the relationship between the site assemblage and potential patterns of raw material utilisation and organisation.

A notable aspect of the lithic assemblage is the high relative frequency of sizeable lithic artefacts. These have been defined as either large flakes or preform specimens. The inventory list available in Grønnow and Jensen (2003:225) also include 216 specimens catalogued as flake material. During my analysis of the assemblage, most of the flake material was regrettably not identified. Artefact categories identified in the present analysis are flakes, preforms/large flakes, microblades, and endblades (Table 17). See part 8.5., Appendix B for comprehensive descriptions, and part 11.5., Appendix E for artefact illustrations.

The three microblades (8.3.2.) and a single fragmented endblade (8.3.1.). suggests brief events of tool maintenance. One of the microblades is made from a brown-grey MCQ type that has

Table 17: Lithic types and raw materials identified in the assemblage from Hvalterrasserne.

Hvalterrasserne	Microblades	Endblades	Preforms	Flakes	SUM
MCQ					
Blue-grey	2	1	6	3	12
Brown	1				1
Black			1	1	2
SUM	3	1	7	4	15

not been observed in any other assemblage from the region. This suggests that the component was replaced after considerable circulation following the procurement of its raw material outside of northernmost Greenland. Conversely, the blue-grey raw material of the endblade is highly similar to the locally available MCQ, suggesting that it was procured and produced within the broader geological context of High Arctic Canada and Greenland.

The prominent artefact categories of the Hvalterraserne site assemblage are large flakes and preforms (8.3.3.). Most of the specimens can be considered generic preforms, although some may be vaguely associated with specific diagnostic types purely based on morphology. Shared characteristics are removal scars indicative of cursory knapping operations by direct percussion technique. Another shared characteristic among several specimens are traces of the original nodule morphology which accords to the tabular shape typical to MCQ nodules in the region. The generally large sizes of the artefacts further indicate an abundance of available raw material in the area.

Summary

The most distinct characteristic of the lithic assemblage from Hvalterraserne is the abundance of lithic raw material as preforms and large flakes. These specimens suggest that relatively extensive sequences of initial stages of component production operations occurred during a single site occupation. Fieldwork observations of a rich local availability of MCQ makes it conceivable that large nodules were procured in the immediate vicinity of the site. Considering the capacity for long-distance raw material procurement indicated by Greenlandic Dorset lithic assemblages, the assemblage is a rare example of distinct lithic procurement and preform preparation. The highly similar raw material properties of deposited endblade with the locally procured nodules indicate that heat-treatment was not involved in the production of lithic components in the region.

The dominance of preforms of seemingly high-quality material in the site assemblage suggests in turn that the occupants were sufficiently provisioned with lithic raw material and component supplies—enough so that seemingly viable raw material could be left behind at the site. The events that formed the lithic depositions were therefore characterised by prudent estimations on the quality and amount of lithic raw materials to be transported as the site occupants eventually proceeded their movements through the region.

4.4.6. *Kap Holbæk*

Kap Holbæk has played a key role in past and present culture-historical definitions of northernmost Greenland. It was following fieldwork here that Knuth proposed the Independence I/II sequence. In more recent years, its lithic assemblage would be pivotal to Sørensen's (2012) redefinition from Independence II to the Greenlandic Dorset.

Kap Holbæk is a complex multi-component site featuring Independence I, Greenlandic Dorset, as well as possible Thule elements. It is located on the cape of the 17 km long Kap Holbæk Peninsula which separates the head of the Danmark Fjord. The point of the cape is a raised plateau at over 100 m.a.s.l, while the rest of the peninsula is made up by hilly lowlands. Knuth identified archaeological traces of prehistoric settlement on raised gravel terraces adjacent to the point towards the south. A tentative total 5 individual dwelling 'groups' were described by Knuth. Groups IV and V are the most ambiguous, both lacking comprehensive descriptions and documentation – particularly Group V, by its material record is interpreted as a site of Thule activity (Grønnow and Jensen 2003:253). Kap Holbæk has been interpreted as a site emerging from multiple visits, each represented by individual groups of people.

Findings related to the Independence II/Greenlandic Dorset were collected from site groups defined as II, III, and IV. In the following, these groups will be termed in Arabic rather than Roman numerals. The site of group 2 is located on the south-facing shore of Kap Holbæk, on beach terraces elevated at around 4,5 to 6,5 m a.s.l. The group is divided into seven individual features, from A to G. A map location of Group 3 was never drawn by Knuth, but its location is described to be on the south-eastern slope of a hill to the north of groups I and II at an elevation around 5,5-6,5 m a.s.l. Group 4 is located to the north of group 2, near the northern slope of a hill at around 17-20 m a.s.l.

Group 2 include features such as mid-passages (A, C, and G), open-air hearths (2 B and D), and a cache (2 F). A small area 10 metres north of 2 C was defined as a lithic workshop, and several lithic artefacts were collected here. Most of the artefacts from Terrace 3 were collected at feature 2 C and 2 D. A total of 115 lithic artefacts were recorded from 2 C, in addition to several organic artefacts such as two needles, one bone fragment, and 21 fragments of wood and bark. Feature 2 D yielded a substantial total of 492 lithic artefacts, in addition to a few pieces of wood and birch bark. 19 lithic artefacts were recorded at feature 2 A, 24 at feature 2 B, and three artefacts at 2 E.

Group 3 is made up by a mid-passage (3 A), box hearth (3 B), and a flagstone pavement (3 C). 4 lithic artefacts were collected at 3 A along with remains of hair and wood shaving, and 25 lithic artefacts were at 3 B. Only a few remains of wood and feather were collected at 3 C.

The features of Group 4 include three tent rings (4 A1, IV B, IV C), three caches (4 D, E, F), and an open-air box hearth (4 A2). Only a few artefacts were collected from this group, with only two collected lithic artefacts. However, fragments of cloven-hoof lances were collected from feature 4 A2, several of which have been refitted by Knuth. In the present study, refitting has demonstrated a direct association between one of the lances and the lithic material.

The available datings from the Dorset component of Kap Holbæk were all sampled from feature 2A. Three samples were collected: Two from driftwood charcoal that yielded calibrated dates of 1430-1050 cal. BC and 1400-1050 cal. BC, and one from muskox bone yielding calibrated dates of 760-400 cal. BC. The latter dating of muskox bone is here considered most reliable.

Although several findings of organic artefacts were made, there is no record of faunal material. The only identified species from the Dorset component of Kap Holbæk is muskox. In this regard, most of the muskox related findings are distinctly ‘tool kit’-components, i.e. cloven-hoof lances. It is not possible to determine based on available records if the muskox bone sampled for dating was from a midden deposit. The fact that organic artefacts have been preserved at the site suggests that the absence of faunal material could reflect an ‘absence’ of particular activities at the site and in the surrounding area during the Dorset occupation(s).

The assemblage from Kap Holbæk exhibits numerous characteristics unique among the assemblages included from northernmost Greenland. These are observed in the raw material composition, artefact types, and to some extent in technological attributes. The most notable characteristic of the assemblage is its raw material composition. This composition is distinct not only by the presence of unique types of MCQ, but also by the distribution of different MCQ types among site features. The technological analyses of Sørensen (2012) have demonstrated distinctions in raw material use at Kap Holbæk between the Independence I and Dorset components, as well as between the Dorset component of Kap Holbæk and Vandfaldsnæs. Lithic types identified in the present analysis include microblades, endblades, endscrapers, sideblades, burin-like tools, adzes, preforms, retouched flakes, and flakes (Table 18). See part 8.6., Appendix B for comprehensive descriptions, and part 11.6., Appendix E for artefact illustrations.

A distinct spatial pattern between MCQ types at Kap Holbæk is represented in the assemblage of microblades (8.6.5.). Two types of MCQ dominates the lithic assemblage: White and grey. The latter type was collected from Group 2A, while the former from Group 2D. Only a single microblade specimen of a grey type was collected from Group 2C (L1.6957), which has been refitted with a specimen from 2A (L1.6945). Comparing the microblade assemblages between 2A/2C and 2D, it is arguable based on raw material frequency alone that the two features each represent two separate events of microblade production and/or component replacement. Although it is not possible to infer the temporal relationship between the two events, they corroborate the interpretation of multiple occupation at the site.

The technological characteristics of the microblades suggests that microblade production occurred at both sites. The presence of specimens with crested surfaces typically related to preparation of microblade core fronts, as well as the refitted specimens between 2A and C, indicate this. However, the high frequency microblades exhibiting dorsal surfaces with more than two parallel removals suggests that most of the knapping procedures were performed on blade cores that was brought prepared to the site. This interpretation is substantiated by the absence of flake

Table 18: Lithic types and raw materials identified in the assemblage from Kap Holbæk.

Kap Holbæk	Microblades	Endblades	Endscrapers	Sideblades	Burin-like tools	Adzes	Preforms	Retouched flakes	Flakes	SUM
MCQ										
White	14	3							11	28
White-grey							1		447	448
Blue-grey								1	11	12
Blue-grey (banded)					1					1
Grey	8	1							117	126
Grey (banded)		1								1
Light grey	1	1		1			1		1	5
Red-grey									3	3
Brown-grey									1	1
Brown			1							1
Brown (striped)									9	9
Light brown		2								2
Black		1		1					10	12
Burned	1									1
n/a	2								2	4
Dolerite										
Black						3			17	20
SUM	26	9	1	2	1	3	2	1	629	674

removals associated with core preparation. In this regard, the presence of specimens with traces of lateral retouch suggests episodes of knife component replacement. In his technological analysis of the Kap Holbæk site assemblage, Sørensen defines a single specimen as a microblade core preform. The present examination of the artefact found its defining characteristics as a microblade core preform insufficient, and the specimen has therefore been defined only as a generic preform (8.6.7.).

The raw material composition of examined endblades (8.6.1.) exhibits some degree of variability, but much less pronounced than seen in the microblade assemblage (Table 19). Five of the eight specimens were collected from feature 2 D, with a single specimen collected at 2 B, 2 C and 3 A respectively. All eight specimens were fragmented, most of which have been categorised as either short or long distal fragments. The remaining specimens were short proximal fragments. Two intact endblades were unavailable for analysis. However, the collected endblades was likely deposited during component replacements made on several composite tools.

Both proximal fragments, collected from feature II D, exhibit the common diagonal fragmentation fracture suggestive of breakage during use. A short distal fragment collected from the same feature (L1.6967) is distinct by its corticated surface, indicating that the original endblade was made from a small natural flake of grey MCQ.

While only a single sideblade was identified in the site assemblage (8.6.2.), it is the most unique specimen examined in this study. A successful refit of the specimen with one of the previously refitted cloven-hoof lances was achieved during the analysis, thus providing empirical evidence for the relationship between sideblades and cloven-hooved lances. The cloven-hoof lance is a self-tipped lance made from muskox bone. Both the sideblade and the remains of cloven-hoof lances were collected from Group 4 A2.

Judging from the assembled raw materials of the cloven-hoof lance, its life-history as a composite tool is assumed to have emerged regionally. Here, raw material for the lance-head was acquired from a successful muskox hunt, before being transported to, prepared, and shaped at a suitable site. As part of an embedded procurement of lithic raw material after the hunt, the hunting party would have identified and procured suitable black MCQ that would be incorporated into the group's tool kit by a concurring process of production where the design of the component and the cloven-hoof lance would mutually emerge from the affordances set by the qualities and properties of the raw materials.

A single burin-like tool (L1.6956) was identified (8.6.3.). It is the second complete burin-like tool specimen identified among assemblages included in this chapter (l: 52,3; w: 25,4; t: 5,5 mm). The raw material of the specimen resembles the common blue-grey type but is still somewhat unique due to its banded colour pattern. Its morphological and technological characteristics are also atypical, such as the considerably broad proximal area and thin cross-section, as well as the deep pressure-flaked removals on the dorsal and ventral sides that makes the specimen resemblant of endblades (the specimen was catalogued as an endblade by Knuth). The defining feature of the specimen as a burin-like tool is its short, polished edge on the right dorsal side.

Three adzes were examined in the present analysis. One of the identified specimens was collected from Feature 2 A, while the remaining two were collected from the lithic workshop northeast of 2 C. The large amount of remaining cortex and sparse, irregular knapping operations performed on the objects suggests that the material was expediently procured and produced, as is characteristic of most Greenlandic Dorset adze components. A lack of dolerite material in the flake assemblages could indicate that the specimens were deposited at the site after having been procured and shaped elsewhere. Their sheer amount of remaining volume suggests that their deposit followed a practice of caching.

Table 19: General size measurements and raw material composition of examined flake debitage from Kap Holbæk.

Kap Holbæk	0-1 cm ²	1-2 cm ²	2-3 cm ²	3-4 cm ²	n/a	SUM
MCQ						
White	1	9			1	11
White-grey	222	207	15	1	2	447
Blue-grey	4	6			1	11
Grey	74	39	4			117
Light grey					1	1
Red-grey	3					3
Brown-grey		1				1
Brown (striped)	3	6				9
Black	2	8				10
n/a					2	2
Dolerite						
Black	1	6	1		9	17
SUM	310	282	20	1	16	629

The raw material variability observed among flakes is evidence of several distinct episodes of activity (Table 19). This variability is also related to the spatial layout of the site, further suggesting their deposition as the result of individual episodes of people visiting Kap Holbæk. The most dominant raw material type is an opaque type of grey-white MCQ. The type has been collected from each of the features at Group 2. At 2 A, only a few large flakes of the type are represented. It is most frequent in the flake assemblages from 2 B and 2 C.

Summary

The examined lithics from Kap Holbæk indicate that their raw material properties and assembled relations with composite tools produced multiple different temporalities of production and tool maintenance, whereby the geographic distribution of raw material types was affected. The site assemblage from Kap Holbæk demonstrates that such events were characterised by brief activities of tool maintenance and component production that involved a broad range of tool technologies. These events and sequences predominantly involved re-stocking of microblade components from cores prepared elsewhere, replacements and rejuvenation of bifacial components, the possible

discarding or caching of several dolerite adze components, as well as the deposit of fragmented cloven-hoof lances.

Overall, the relatively unique composition of raw material types seen in the Kap Holbæk lithic assemblage suggests that the site occupants had operated within a different network of movement outside the ones represented by the sites in Wandel Dal, Jørgen Brønlund Fjord, and Johannes V. Jensen Land (see also Sørensen 2012:235). However, the variability of raw material does not necessarily point towards a historically and regionally *separate* network of movement, making it is conceivable that the site was visited by small groups of people that moved between northernmost Greenland towards northeastern Greenland.

4.5. Discussion

The re-examination of lithic assemblages from northernmost Greenland through a Relational Approach makes it possible to elaborate the dynamics that shaped a uniquely brief history of human living in one of the harshest environments of the world. The analyses presented in this case-study strongly suggest that people brought highly prepared tools and tool kit supplies as they dispersed into the region. This had important effects on how lithic materialities influenced their brief history here. Thus, the emerging lifeway in the region was highly contingent on the various human-material relations that preceding tool kit preparations had established. As assembled relations of lithic, composite tools, and tool kits became introduced to the region by pioneering groups of people, they guided and demanded the responses people made to their new environment. This formed a highly transient relationship between people and the regional landscape.

Recurring tool maintenance became crucial to the unfolding lifeway of people in northernmost Greenland. Assemblages of bifacial components are most indicative of this. The high proportion of proximal and long distal fragments of finished endblades in the assemblages strongly suggests that such components were primarily discarded following breakage by use. None of the fragments have been possible to refit, indicating that the fragmentation typically occurred off-site. Distal fragments would either be brought to the site embedded into the carcasses of hunted game animals (Coulson and Andreassen 2020:17) or broken off during on-site use. Proximal fragments that were fragmented off-site would most likely still have been part of composite tools that were brought to the site. We can therefore assume that the replacement of redundant components would

typically occur near a dwelling area. A possible explanation could be the dependency on a source of heat to detach glued and/or lashed components from their hafts.

The scarce remains of flake debitage could not be associated with the deposited components nor to the later stages of bifacial component production. Replacements of bifacial components such as endblades, sideblades, burin-like tools and endscrapers would instead be made by prepared components kept in portable supply. While the episodes of component replacement were probably made in response to unintended events, the practice of keeping portable supplies meant that people had planned their responsiveness ahead of time. Such a perspective makes it conceivable that although people moved into a new and unknown landscapes, the nature of their intentions and interactions here were significantly premeditated and structured by how their portable tool kits had been assembled beforehand.

While this premeditated responsiveness is best indicated by inferring the assembled relations of tool kits, it might also be indicated by the design of endscraper components examined in the case-study. The analyses point to the possibility that these components would at times have been designed as hybrid components that included a sidescraper function. Among the examined endscrapers, the most consistent traits is an asymmetrical design with a cornered distal edge, often featured on the right dorsal side. During the examination, the relation between the opposite lateral notches was observed as diffuse, where only one of the two notched had been meticulously shaped. Following the common conception of such side notches on lithic endscraper components, these would normally be considered a design for the purpose of hafting (see Morrow 1997). However, the morphology of the notches prompted a reconsideration of the design purpose of the notches.

Firstly, the angles of the notches were observed to be similar to the front scraper edge. Secondly, several specimens feature notches with a distinctly smooth crescent shape that does not appear to have been produced by ventral removals, suggesting that these were worn down by use. The angle and shape are thus highly resemblant of sidescraper edges. As such, it is here considered possible that endscraper notches could have been made to design hybrid components that could be used as endscraper and sidescraper interchangeably. The prevalence of this design could explain the absence of typical Greenlandic Dorset sidescrapers specimens in the lithic assemblages from northernmost Greenland. Rather than transporting additional supplies of sidescraper components as well as endscrapers, opting for a hybrid design would have mitigated the amount of supplies that people had to carry.

Lithic materialities during the Greenlandic Dorset of northernmost Greenland played an important role in constituting both premeditated and situated responsiveness. The responsive tool kit strategies at the time did not only involve stocking up with portable supplies of reserve components. They also involved expedient production of certain components, most notably microblades and adzes.

Assemblages of microblades are primarily observed as the remains of component replacements, both from components prepared elsewhere and prepared sequences of production. Refitted microblades indicates that microblade knapping involved some degree of spatially divided labour. The distribution of microblades between features may have been part of a highly monitored production of microblades where the sequence of operations made by a relatively novice knapper were frequently evaluated by a senior knapper.

Although only a few microblade cores are featured in the lithic assemblages, these exhibited distinct technological attributes that sheds light on their temporalities. Overall, their attributes are virtually identical—not only by the large, highly regular microblade removal fronts, but most prominently by their negative removal scars indicative of microblade core preparation. These include preparation flaking removals made for a keel-shaped morphology, featuring a characteristic distal core preparation removal. The absence of associable flakes underlines that the cores were prepared prior to the regional site occupations. When considered along with the remains of microblade production at various sites in northernmost Greenland, it becomes clear that microblade cores were circulated across vast distances, constituting a unique and highly curated part of the tool kit supply. The serial nature of microblade production along with the high quality of the chosen lithic raw material were important in this regard.

No remains of primary microblade core production were observed among the assemblages. Judging from the brief episodes of microblade production, it is possible that the deposited microblades were produced from cores that were part of a groups tool kit supply both prior and after the visit to the region. Unlike the microblade core from Kap Holbæk, none of the microblade cores from Kap Harald Moltke appears to have been exhausted of potential to produce microblades. As such, they might reflect a form of caching where people would leave behind tool kit supplies. This would both serve as a possible supply for future occupants at the site, as well as to reduce the amount of transportable material.

The inferences made from remains of adze production and maintenance starkly contrasts those made from the microblade assemblages. Among the different lithic types examined in the case-study, adzes generally indicate the shortest circulation between procurement and deposition. Proceeding their procurement, dolerite nodules were shaped into adzes by a few, crude removals by direct percussion techniques. Such technological characteristics, along with the refitting of dolerite flake debitage, suggests highly pragmatic utilisation of dolerite as well as adze technology, whereby dolerite would be expediently procured and knapped before being briefly circulated as finished adzes. Comparing the inferred circulation of adzes and microblades, we see that people entered northernmost Greenland with specific expectations and strategies for different tools as well as for the quality and availability of regional lithic raw materials.

We can now recognise how assemblages of relations constituted by portable tool kits contextualised and situated the ways people lived during their brief presence in northernmost Greenland. These tool kits would include a variety of composite tools for different tasks and supplies of components for the various tools. The composition of these tool kits and portable supplies reflects the projections, expectations, and desires that shaped how people had planned and prepared their movement into the region.

Moving into vast, unknown landscapes required prudent decisions on which tools to bring and the amount of reserve components to be kept in supply. As the hunt for migrating and roaming game species would have been crucial to living here, people would have prepared dependable supplies of endblade points and sideblades in addition to organic harpoon- and cloven-hoof lance heads. The refitted cloven-hoof lance and side blade from Kap Holbæk demonstrates how certain relations between lithic and organic materialities could have strong territorialising effects on the design of lithic components. Furthermore, within the brief historical context of the regional Greenlandic Dorset the cloven-hoof lances made from muskox bone strongly suggests that people were already highly familiar with muskoxen as a game species. This is corroborated by the high proportion of muskox remains in the available faunal record, as well as by the findings of supposed muskox tooth pendants. Whether the pursuit of muskox was a primary motivator for people to enter the region, we should consider familiar human-animal relations with muskoxen among the conditions that shaped the brief presence of people here during the Greenlandic Dorset.

While the topography of northernmost Greenland would have been unknown to people entering the region, they would still encounter familiar beings in the landscape. The lithic raw

materials of the region were among these. This is evident by the similar raw material of components deposited during tool kit maintenance and lithic debitage deposited following procurement. Thus, the quality of the regional lithic raw material would have been familiar to the visiting groups. The present case-study has been able to identify events proceeding novel interactions between people and the regional lithic raw material. These are most notable in the lithic assemblage from Hvalterrasserne.

In addition to a locally rich availability of high quality lithic raw material, the lithic assemblage suggests the contingent raw material selectivity of the site occupants. The flakes and preforms that dominate the lithic assemblage indicate that people staying at the site had recently procured and tested locally available lithic raw material. This blue-grey type of MCQ that dominates the lithic assemblages from northernmost Greenland would not require heat-treatment, as neither finished components or lithic debitage of the specific MCQ type indicate the traits associated with the method. If they so desired, people could therefore have engaged in protracted sequences of lithic production upon procurement. However, it instead seems that people would collect and briefly test several nodules before bringing them to the nearby dwelling. As remarked in the analysis, the fact that sizeable and seemingly high-quality raw material was discarded at the dwelling indicate that its occupants made prudent decisions on the amount and quality of raw material to be carried off. In context of the inferred tool kit assemblages at the time, these choices would have been highly contingent on available composite tools and tool kit supplies. The prepared flakes and preforms that were transported away would later become influential to tool kit preparations.

By now, the discussion has elucidated how lithic materialities defined and were defined by historically unique human-material relations. These relations constituted the material contexts of portable tool kits, which in turn helped define the brief history of human living in the High Arctic. These inferences allow us to adjust our general perspective on the Greenlandic Dorset period of northernmost Greenland.

As much as a lithic component does not totally define a composite tool, the production, rejuvenation, and replacement of such components did not totally define the preparation and maintenance of tool kits. In a similar vein, the emerging perspective underlines how lithic assemblage size alone cannot totally define our archaeological interpretations of human living. The Kap Mylius-Erichsen site with its scarce lithic assemblage yet numerous structural remains and

organic material assemblages is a case in point. Its lithic assemblage, along with the other lithic assemblages from the region, does however strongly suggest how important the historically contingent strategies for tool kit preparation and maintenance were to their formation.

We can therefore appreciate the formation of scarce lithic depositions as more than representations of brief activity either locally or regionally. This scarcity must also be considered a consequence of people arriving to the region with prepared tool kits along with specific expectations and desires. People had prepared their tool kits to be highly portable as well as to require minimum expenditure of time and effort into tool maintenance. The less time spent on maintaining tools, the more time could be spent on more desirable activities. Strategic mitigations such as these would be highly pertinent to expansive movements in High Arctic environments within a season.

That people left behind scarce lithic depositions was in fact not a consequence of people not developing complex relations in the region, but rather a consequence of people already having arrived with complex, assembled relations and experiences. The assembled relations of humans and portable materialities facilitated premeditated and situated responsiveness to the regional landscape and environment.

We can thus recognise how the brief presence of people in northernmost Greenland was allowed by people's previous experiences in different but similar High Arctic environments. These experiences defined and were defined by the continuous assembling/re-assembling of tool kits, which constituted the strategies, expectations, and desires of people entering the region. This helps to explain why a complicated settlement system was never developed in northernmost Greenland during the Greenlandic Dorset: The small groups of people entering the region had already planned and decided beforehand that their presence here would only be seasonal. Establishing complex settlement systems would not have been desired. People instead desired to nurture their familiarity and responsiveness to various High Arctic landscapes and ecologies, which afforded them to maintain complex and dynamic human-material relations assembled by portable tool kits.

4.6. Conclusion

Portable tool kits and their affordances were crucial to the ability of people to seize the opportunity of expanding into northernmost Greenland during favourable seasonal and climatic conditions. By the deployment of a relational approach, I have here elucidated how lithic materialities defined and

were defined by these affordances. While the present case-study supports the previous assessment by Grønnow and Jensen of Greenlandic Dorset living in the region as brief, long-range dispersals of small groups, elucidating historically contingent human-lithic interactions has offered a far more comprehensive perspective on the dynamics that formed a remarkably unique history of High Arctic living.

The case-study has revealed that people arrived with highly prepared tool kits. This was the result of prudent tool kit preparations that had preceded the short but rapid warm-season dispersals into the region. It is yet impossible to accurately assess where these preparations might have taken place, but judging from raw material types of deposited lithic, they would have transpired in the geologically similar regions to the west of Peary Land—from Washington Land in northwest Greenland to Ellesmere Island on the Canadian side of the Nares Strait. The lithic assemblage from Kap Holbæk is possibly an exception due to its different raw material composition, which might suggest preceding events of lithic procurement and tool kit preparations in adjacent areas towards the southeast.

Tool kit preparations made prior to the journeys of groups along the Muskox Way into northernmost Greenland had produced assemblages of relations that set important preconditions for how people could respond to the regional High Arctic environment. An important part of this responsiveness was the constant demands for curation exerted by tool kit technologies—demands that were met through component rejuvenation, replacement of prepared bifacial components, production from highly curated microblade cores, and expedient production of adzes from locally available dolerite. Through maximised efforts into tool kit preparations, efforts into lithic component production became hardly necessary nor desirable as groups ventured into the region—even when lithic raw material was abundant. Furthermore, discernible events of lithic procurement indicate that people prudently measured the minimal necessary amount of locally available raw material against the supplies of prepared reserve components. These were careful choices that afforded to the portability of tool kits during the necessary long-distance travels, resulting in excessive raw material being left behind.

The highly prepared tool kit supplies that facilitated expedient tool kit maintenance and measured procurements of lithic raw material significantly mitigated the efforts that had to be invested in tool maintenance and production. This in turn improved but also demanded a capacity of people to engage in highly intermittent long-distance travel and exploration, hunting, and other

matters of importance. Incidentally, this formed an ephemeral archaeological record across the vast landscapes of northernmost Greenland.

While brief, the presence of people in northernmost Greenland during the Greenlandic Dorset period helped reify their lifeways elsewhere. Even if people did not revisit the region during the period, the assemblages of relations that emerged here would have been important to promoting the continued ability of people to survive in other adjacent High Arctic regions, including northwest Greenland and Ellesmere Island in Canada. As groups that had ventured into northernmost Greenland returned abandoned the region for their winter dwelling sites, it is highly conceivable that they would then encounter other groups that had dispersed into different landscapes. Through sharing of knowledge and materials, even people that themselves would not venture into specific regions would become historically tied to and influenced by these.

Chapter 5 - Gatherings at the edge of the Polar Sea – The Greenlandic Dorset of Île de France

From the vast landscapes of northernmost Greenland, the final case-study turns to the small island of Île de France, situated along the coast of northeastern Greenland. By a Relational Approach, this case-study revisits eleven lithic assemblages collected by Eigil Knuth at Kap Skt. Jacques on the southern cape of the island. The site was among the final and most spectacular archaeological discoveries of Knuth, who recorded hundreds of site features here. Only a limited number of these features would be excavated, but they yielded an amount of lithic remains far surpassing those excavated in northernmost Greenland. It is primarily from the fieldwork itself and subsequent cataloguing of its lithic assemblages that Île de France is recognised as an attractive gathering site for highly mobile bands of people. These people would roam between resource rich areas along a narrow coastline northward to the Northeast Water Polynya and southward along more open coastal landscapes around Dove Bugt and beyond. During the Greenlandic Dorset period, the island was visited and revisited by multiple groups on numerous occasions. The site marks the rapid circum-colonisation of Greenland by groups belonging to the Greenlandic Dorset technological tradition—all around from northernmost Greenland, southwards to the southernmost tip of Greenland, and northwards towards Nordostrundingen. This was indicated by a prescriptive chaîne opératoire analysis. On this basis, the lithic assemblages from Kap Skt. Jacques now represents a local adaptation of the Greenlandic Dorset technological tradition to the various lithic raw materials available in northeastern Greenland. The present case-study comprises their first in-depth analysis. Instead of regarding them as representations of culture-history and resource adaptation, the present analysis reveals how lithics exerted demands that were significant to the historical process and consequences of this adaptation. From a relational perspective, lithics therefore actively contributed to the formation of Kap Skt. Jacques into a crucial gathering site in the broader region. Brought to the site by mobile bands, the properties and temporalities of lithic and tool kit materialities structured the preparation and sharing of locally procured lithics. These events were important to the consolidation of social relations between highly mobile groups, while simultaneously staging their continued interactions with a rich yet precarious regional environment.

Figure 14: Map of Île de France and its adjacent areas. Map by Edwin Bolhuis.

The third case-study of my thesis examines lithic assemblages that were excavated on the island of Île de France, situated along the coast of northeastern Greenland (Figure 14). On its south-western tip lies Kap Skt. Jacques, a unique site in eastern Arctic archaeology. Not only is it unique for its considerably large clustering of dwelling remains within a small area; the lithics assemblages collected among its numerous features constitute a unique and important part of Greenlandic Dorset archaeology.

The history of archaeological research on Île de France is tied to Eigil Knuth's career of High Arctic fieldwork. This career was bookended by his fieldwork on Kap Skt. Jacques. His first brief visit to the island's cape in the 1930s would be followed by a much later and more dedicated effort at surveying and excavating the site.

Relative to the total amount of dwelling remains identified at the island, only a few were excavated during Knuth's fieldwork here in 1988 and 1989. It is therefore impossible to estimate the exact scale of the site, and the lithic assemblages must be considered but a sample of its actual archaeological deposits. Fourteen of the excavated features yielded collections of lithic remains, and in this case-study eleven of these have been accounted for and examined. Following the outlining of the island's history of research, my technological analyses are presented. Conclusively, these will be summarised and discussed in the final part of the chapter, expanding current interpretations by demonstrating how lithic materialities contributed to form an unprecedented site in Early Dorset archaeology.

As in the previous two chapters, I will first briefly introduce the region. This will primarily entail the geography of Île de France, with an eye to the surrounding area. Thus, the geographic scope of the chapter is not truly regional. However, due to the size of Kap Skt. Jacques, the empirical scale of the chapter is comparable to the previous chapters.

5.1. Regional geography, topography, and environment

Unfortunately, there is limited detailed environmental and archaeological information on Île de France, and its immediate surroundings i.e. the southern part of Jøkelbugten and the northern part of Germania Land (Figure 14). This section therefore presents only a highly generalised summary that covers the broader archaeological record and environmental information of northeastern Greenland (Andreasen 1997; Grønnow and Jensen 2003).

Île de France is situated immediately north of Germania Land, and near the southern edge of the Northeast Water polynya area that spans the coastline towards Nordostrundingen in the north. Between the Greenlandic ice sheet and the polar ocean, the coastline north of Île de France towards Nordostrundingen is made up of coastal forelands up to 10 kilometres wide that slowly rise up to ~ 100 m a.s.l that foregrounds low mountains with plateaus that gently undulates between 400 and 600 m a.s.l (Hjort 1997:24). The topography of Île de France is dominated by an icecap that covers most of the island, leaving only narrow strips of ice-free areas along its shores. Kap

Skt. Jacques is the largest ice-free area on the island, its terrain characterised by a complicated system of gravel beach ridges and boulders (Grønnow and Jensen 2003:278). The beach ridges indicate the changing sea levels in northeast Greenland since the last Ice Age.

From the beginning of the later Holocene era, ~ 5000 years ago, the conditions in northeast Greenland would develop in favour of the formation of polynyas. Although an increased influx of ice had begun due to climatic deterioration, post-glacial developments in sea level (from shorelines at ~ 80 meters above current sea level to ~ 10 meters) would create conditions enabling areas of open water to form. Sea floors in the region became shallower, resulting in the trapping of ice in large amounts along the northern part of northeast Greenland. This would create a semi-permanent ice-barrier that stopped southbound ice while permitting north-flowing water to enter the region. Additionally, prevailing winds from the northwest would contribute in the northern part of the area by pushing ice away from the coast, resulting in more intermittent ice break-ups and polynyas opening earlier in the year (Hjort 1997:29-30). While sea-ice conditions were gradually becoming more stable, they remained variable throughout the Paleo-Inuit prehistory. It is only in the last 1000 years that the region has sustained stable open-water conditions (see Syring, et al. 2020). Thus, the basis for human living in the region was highly contingent on longer or shorter spells of warmer climate (Hjort 1997:31)

During more optimal climatic conditions, the fauna of northeastern Greenland would primarily provide people with sea-mammals or seabirds. Notable species hosted in the area are walrus as well as bearded- and ringed seals (Andreasen 1997:24). The climatic and topographic conditions along the coastline ranging from Nordostrundingen southwards towards Île de France at the time of the Greenlandic Dorset would not support populations terrestrial species such as muskox. These conditions would, on the other hand, be available in Germania Land and Dove Bugt towards the south (Andreasen 1997:44-45).

5.1.1. *The lithic raw materials of Île de France and adjacent areas*

The geological profile of the lithic collections from Kap Skt. Jacques is dominated by the presence of quartz crystal and has been central to interpretations of its Greenlandic Dorset occupation. The available sample of remains from the Greenlandic Dorset occupation of the island indicate that the frequency of quartz crystal increased throughout the use of the island. MCQ dominates at the higher elevated sites, and as one goes lower and lower, quartz crystal becomes the dominant raw material.

However, Grønnow and Jensen questions the veracity of this estimation, due to the limited amount of lithic material excavated at the higher elevations (Grønnow and Jensen 2003:295).

The geology in the area surrounding Île de France is characterised by the ‘Caledonian folds’. These folds consist of gneiss with few areas of amphibolite and marble. Formations of sedimentary rock are also found in the area, where slates, sandstones and quartz can be found (Sørensen 2012:71-75). Geological features rich with quartz have been found near the central plateaus of Germania Land, at around 300-350 m a.s.l (Landvik 1994:83). From Dove Bugt and southwards, lithic assemblages are dominated by variations of MCQ. Archaeological findings of quartz are most frequent northwards from Germania Land. Further to the north from Jøkelbugten to Nordostrundingen MCQ becomes again more frequent. Identified nodules of lithic raw material here include MCQ colour variants such as red and red-brown, white with light and dark blue parts, and light blue (Sørensen 2012:73-75). A recent detailed study of lithics collected from the Eigil Knuth site in Holm Land (Coulson and Andreasen 2020) describes variants of the red and red-brown MCQ, as well as lithics of black and white quartzite. The assemblage also includes a blue-brown variant of MCQ. The quartzite and the blue-brown MCQ from the site does not match the regional raw material types described by Sørensen (2012), but a regional provenance cannot be excluded.

5.2. The history of research on the Dorset of Île de France

After having briefly passed Kap Skt. Jacques on a sledge voyage in 1938, Knuth returned on the 14th–15th of June in 1939 to record six ruins. This was prior to the discovery of Paleo-Inuit cultures in north-east Greenland, and so the appearance of five ruins as mid-passage dwellings would not be recognised at the time (Grønnow and Jensen 2003:278). However, despite having long-since made the discovery of their presence in the region, Knuth’s fieldwork on Kap Skt. Jacques during the twilight years of his career still left him puzzled to the exact cultural provenance of the site.

It was in 1987 that Knuth recognised the immense scale of Kap Skt. Jacques, on his first visit since 1939. At this point he also had to acknowledge that the site was predominantly formed by Paleo-Inuit people. Following this spectacular discovery, Knuth immediately organised fieldwork at the site in the following years of 1988 and 1989. The fieldwork consisted primarily of surveying, mapping the site by plotting individual ruins onto aerial photographs along with the combination of sketches of site segments and measurements. Hundreds of individual ruins were

discovered during these two years of fieldwork (Grønnow and Jensen 2003:279). Knuth documented a total of 584 features in his logbook. During their cataloguing and examination of Knuth's archive, Grønnow and Jensen omitted 13 features from the site database for lack of defining features (Grønnow and Jensen 2003:280). Of the 571 recorded features, only 467 were plotted onto the site map (Figure 15). The location of the remaining 107 features is unknown and could be located either between ruins marked on the map or outside the mapped area.

The limited scope of fieldwork conducted on Kap Skt. Jacques is arguably the main reason for the tentative nature of the typology made of its identified ruins. Knuth recorded a total of 274

Figure 15: A rendition of the site map over Kap Skt. Jacques drawn by Eigil Knuth (Grønnow and Jensen 2003:279).

mid-passage ruins. Their arrangements differ, although these are documented by subjective and cursory descriptions. 47 ruins were recorded as mid-passages with a surrounding tent ring, 101 as built by flagstones, 54 as set with boulders, and 15 with a combination of flat and rounded boulders. Besides the mid-passage arrangements, 33 features were recorded as caches, 16 as open-air hearths, five as pavements, three as tent rings with a central hearth, 26 as tent rings with no internal structures, and 33 as amorphous structures. A total of 181 were given no description besides their elevation above sea-level (Grønnow and Jensen 2003:280).

Of the immense number of Paleo-Inuit ruins recorded by Knuth at Kap Skt. Jacques, eleven were excavated. Regrettably, the excavated features are not specified on his site map. In Grønnow and Jensen's catalogue of Knuth's archaeological archive, it is stated that artefacts were collected from a total of 25 features. During the analysis, however, artefact collections were only available from twelve features. Due to the limited number of lithic remains available from Feature 120, its assemblage is not included in this chapter, but is instead available in Appendix C.

5.3. Current perspectives on the Greenlandic Dorset of Île de France.

The present understanding of Kap Skt. Jacques is highly partial. Until recently, the site has been understood from the work and perspective of Eigil Knuth. Given that Knuth never collated and published his fieldwork on Île de France, he was unable to fully assess how the site related to the broader prehistory of Greenland. While recognising that the site predominantly included material remains of Paleo-Inuit, Knuth remained uncertain if it was related to the Independence II or Dorset. His definition of Kap Skt. Jacques as an Independence II/Dorset site was primarily based on the absence of artefacts from earlier Paleo-Inuit cultures (Grønnow and Jensen 2003:280).

In their assessment of Île de France's relation to the Paleo-Inuit archaeology of Greenland, Grønnow and Jensen contains their scope of comparison within Knuth's archaeological fieldwork in northernmost Greenland and northeast Greenland. Here, Kap Skt. Jacques is referenced by Knuth's Independence II. Its presence in these two regions are here compared in terms of site quantity and lithic assemblage sizes. Compared to its brief culture-history in Peary Land, the Independence II to the south of Nordostrundingen appears to have been maintained for a longer time. Grønnow and Jensen points to the broader diversity of resources in northeast Greenland as an explanation for this, with the zooarchaeological record indicating a more localised and broader range of available game species.

Adjacent to Germania Land to the south and the Northeast Water polynya to the north, the position of the island would have made it ideal for settlement and resource acquisition. Interpretations on the human history of Kap Skt. Jacques have primarily been made from assessments of dwelling types and their distribution, along with analyses of available faunal remains. Some important aspects of the island's archaeology have thus been recognised. Kap Skt. Jacques is regarded as an aggregation site where people gathered on numerous occasions. The spatial arrangement and preservation of site features indicate that these were brief episodes of site occupation. This is indicated both by signs of site disturbances from secondary site occupations, as well as the linear arrangement of features along prehistoric shorelines. Discernible arrangements range between three to ten clustered dwellings (Grønnow and Jensen 2003:296). Such site arrangements have not been observed in the neighbouring Dove Bugt area or in Holm Land and Amdrup Land to the north (Andreasen 1997:45), where mid-passage dwellings typically occur in isolation.

The available faunal remains indicate the seasonality of the site occupations. The presence of harp seals, birds, and muskox suggests that the island was visited during the warmer season. It should be stressed that the representativity of the zooarchaeological sample is likely as incomplete as that of the lithic assemblage. Furthermore—as Grønnow and Jensen points out regarding the faunal sample of Peary Land—one must keep in mind the higher visibility of warm-season markers (see part 4.1., Chapter 4). Tables showcasing the collected faunal remains from Kap Skt. Jacques can be found in their work on the material (Grønnow and Jensen 2003:282-295). While the most abundant remains are from harp seal and polar bears, the faunal data has not been analysed for minimum number of individuals. It is nonetheless obvious from the sample that people here would hunt a diverse variety of Arctic game at the time, with an emphasis on sea-mammals. This emphasis is prevalent throughout the broader regional context of the Northeast Water polynya, with a variety of species including walrus and different species of seal. The remains of muskoxen also connects the archaeology of Île de France to the landscapes of Germania Land and Dove Bugt, where such species would have been available (Andreasen 1997:44).

The regional availability of resources is also observed in the lithic assemblages from Kap Skt. Jacques. Inter-regionally, lithic assemblages from the Greenlandic Dorset period demonstrate a shift in raw material use as one move to the south of Nordostrundingen, where archaeological assemblages are dominated by quartz crystal. The rarity of quartz crystal in Peary Land in the

archaeological record is suggested as a result of highly limited exchange and movement of people between the two regions (Grønnow and Jensen 2003:339).

In his description of the Greenlandic Dorset culture-history, Sørensen (2012) refers to the lithic assemblages collected at Île de France to assess the historical relationship between the island and Peary Land during the Greenlandic Dorset. However, the relation between Île de France and Peary Land relies primarily on the history of research rather than extensive empirical re-examinations. The dominance of quartz crystal at the site and the complete lack of similar raw material in assemblages from Peary Land is emphasised, by which it is argued that there were no direct movements of groups between northernmost and northeast Greenland during the Greenlandic Dorset. As such, it is considered unlikely that people in Peary Land migrated to the area from northernmost Greenland, in contrast to Knuth's thesis on the culture-history of Independence II. Rather, a regional network of movement emerged in northeastern Greenland following the migration of groups from the south, defined by the prominent use of quartz crystal at Kap Skt. Jacques.

However, basing the idea that people did not move between northeast Greenland and northernmost Greenland on frequencies of raw material is implicitly challenged by the recently published technological study of the Eigil Knuth site in Holm Land southeast of Nordostrundingen. As referenced in part 5.1.1, the lithic raw material composition of its site assemblage is dominated by MCQ and quartzite rather than quartz. Thus, the site indicates that people in NE Greenland were not as committed to the use of quartz as has been suggested by quantitative comparisons between lithic assemblages from northernmost Greenland and Île de France by Sørensen. Furthermore, despite the dominance of quartz among assemblages from Kap Skt. Jacques, they still include a variety of other lithic raw materials. Framed by the Relational Approach, the technological study of the assemblages will in this case-study qualitatively assess the contingent human-material relations co-created by these different raw materials. The following question will therefore be answered: **How did lithic raw materials influence the circulation of lithic materialities and their deposition at Kap Skt. Jacques?**

5.4. Re-assembling the Greenlandic Dorset of Île de France

The archaeological collections from Île de France are currently stored at the Greenland National Museum and Archives in Nuuk (NKA). For this case-study, the material was analysed during a

two-week visit in early 2019. Most of the available material is kept in its museum storage, with some on display in its permanent exhibition.

As with the sites excavated by Knuth in Peary Land, spatial information from the excavated sites of Kap Skt. Jacques is limited. Although descriptions of the features are available in Grønnow and Jensen's compilation of Knuth's archive, they offer limited or no information regarding their spatial layout (see Chapter 4). Thus, in situ distribution of artefacts can only be partially derived from the documented features.

By the comparisons made between the available archaeological material and the inventories of collected artefacts (in Grønnow and Jensen 2003), archival taphonomy appears to have severely affected the current condition of the collections. Most of the contributing factors to the current archival state of the recorded collections were not possible to identify during the analysis. However, as most of the assemblages have not been examined after their collection, this discrepancy is likely to have occurred after their collection. This timeline has involved the transportation of material from Greenland to the National Museum of Denmark, and storage there before being repatriated to NKA where they have been stored since.

A recurring issue faced when analysing the lithic assemblages from Kap Skt. Jacques is the discrepancies between previous inventories and the number of objects in the assemblages. During the analysis of the material, the discrepancies were considerably more pronounced than previously assessed in the cataloguing of Knuth's archaeological archive by Grønnow and Jensen. Thus, the catalogued inventories cannot be considered reliable assessments of the available material currently in storage at NKA.

An archival issue with obvious cause identified during my analyses was the choice of labels for artefacts following their collection. Upon unboxing the lithic material, many objects were seen to have been labelled by stickers, most of which had detached. This is of considerable consequence to the analyses, disallowing the classification of numerous individual objects in deference to available fieldwork documentation. The analysis and photographic documentation of the lithic remains collected from Kap Skt. Jacques was also made challenging by the qualities of the quartz crystal material. Typically, the material is highly translucent, and removal scars often feature erratic ripples and conchoidal fracturing. Also, the natural glass-like surface of such material can also be highly irregular, ranging from surfaces as smooth as window glass, to shattered surfaces resembling cracked windshields.

Should the sites at Kap Skt. Jacques each represent a Greenlandic Dorset occupation, the number of excavated features makes up less than 5% of recorded sites on the island. Of the fourteen catalogued lithic assemblages excavated at Kap Skt. Jacques, twelve of these were available during my research stay at NKA. Among these, the lithic assemblage from Feature 120 is omitted from this chapter, as it includes only two artefacts with arbitrary attributes (see part 9.2, Appendix C). Despite the relatively rich amount of material excavated from Kap Skt. Jacques, the available collections must necessarily be considered a small sample.

5.4.1. *Feature 101*

Feature 101 is described as a mid-passage tent ring, located near the tip of Kap Skt. Jacques. The boulder periphery of the tent ring measures 3,6 x 4,5-4,8 m. The mid-passage is recorded as disturbed. Floors of flagstone pavement are also preserved, predominantly to the north-western area. Its site assemblage is the largest collection of lithic material from the island. Most of the lithic artefacts collected from the feature were found in a fan-shaped distribution in front of the entrance, with a notable cluster of debitage towards its western limit.

Grønnow and Jensen discusses several discrepancies in the available find lists from Knuths excavations of 1988 and 1989. The discrepancies are primarily related to the number of finds listed in available excavation reports and the excavation summary list. As they are described, the discrepancies are minor, predominantly due to inconsistent artefact definitions such as that between ‘microblade cores’ and ‘irregular cores’. These discrepancies are concluded to be of little consequence.

Upon re-examination of the excavated material, considerable discrepancies were seen between listed finds and the number of artefacts identified in the collection. This is most prominently seen in the assemblage of microblades and the flake material. Due to the limited time available for examining the collections, missing artefacts could not be accounted for. Regardless, the collection remains one of the largest individual lithic assemblages from Kap Skt. Jacques. Lithic types examined in the present analysis include microblades, microblade cores, endblades, endscrapers, sidescrapers, sideblades, burin-like tools, and flakes (Table 20). See part 9.1., Appendix C for comprehensive descriptions, and part 12.1., Appendix F for artefact illustrations.

The most prominent lithic type in the assemblage are microblades. A total of 104 specimens were examined (9.1.6.). As the catalogue lists a total of 244 microblades, this number is highly discrepant. The microblades are predominantly made from quartz crystal. The remaining specimens are all made from MCQ. Overall, the technological attributes of specimens of both quartz crystal and MCQ are similar, although more variety is observed among the former.

The assemblage of quartz crystal microblades is most characteristic for its relative abundance of specimens that can be attributed to sequences of primary microblade production. The different categories of microblades include standard microblades (57), microblade preparation blades (14), microblades with retouch (9), as well as a single specimen with both traces of preparation and retouch for hafting. Only four specimens featured traces of cortex.

Table 20: Lithic types and raw materials identified in the assemblage from Feature 101.

Feature 101	Microblades	Microblade cores	Endblades	Endscrapers	Sidescrapers	Sideblades	Burin-like tools	Flakes	SUM
MCQ									
White				1				14	15
White-grey	6		2			2			10
Blue-grey			1					1	2
Grey	3								3
Light grey	7						1		8
Brown-grey	5								5
Brown-grey (banded)	1								1
Brown						1			1
Light brown								7	7
Green				1					1
Killiaq									
Dark brown			1						1
QC									
n/a	82	20	10	12	1	1		92	218
Quartzite									
Blue-grey			3	1					4
Grey			1						1
Red-grey			1						1
SUM	104	20	19	15	1	4	1	114	278

Table 21: General size measurements and raw material composition of examined flake debitage from Feature 101.

Feature 101	0-1 ² cm	1-2 ² cm	2-3 ² cm	SUM
MCQ				
White	2	12		14
Blue-grey		1		1
Light brown	3	4		7
QC				
n/a	46	43	3	92
SUM	51	60	3	114

Three large microblades of translucent, high-quality quartz crystal were refitted. The specimens are notably larger than other microblades in the assemblage. They also exhibit traits associated with microblade core preparation. Thus, the microblades were likely removed from a core that was in circulation prior to and after their production. In this scenario, it is conceivable that more microblades were produced that were either fitted into a composite tool or kept in tool kit supplies. It can therefore be inferred that the microblades were produced during a brief event of tool kit preparation.

The assemblage of microblades made from MCQ feature far fewer specimen indicative of production sequences. No microblades with dorsal surfaces evident of core preparation were identified, while a total of 17 specimens were identified as standard microblades without retouch. Five specimens featured retouch indicating shaping for hafting. As with the microblades of quartz crystal, only a relatively few specimens exhibited any visible traces of cortex, with just two specimens. Along with the general technological attributes of microblades made from MCQ, the fragmented specimens suggest that deposit of microblades primarily followed component replacement. This is further indicated by the complete absence of microblade cores made from MCQ in the lithic assemblage.

A total of 20 microblade cores made from quartz crystal were identified in the assemblage. The cores were divided into three categories, including keeled microblade cores (15), irregular core (1), and distal core rejuvenation fragments/flakes (4). The microblade cores emphatically indicate stages of primary production. A proportionally large number of specimens featured corticated surfaces, with a total of eight specimens. The degree of cortex varies but most exhibit a considerable amount, with an average at ~37%. This suggests that the deposit of quartz crystal microblade cores occurred after limited sequences of production following the procurement of the

nodules. Specimen x179 is a case in point. The specimen is a small core with ~50% cortex, exhibiting only three small microblade removals terminated by a hinge fracture. Also, only a few removals were made to prepare its platform.

The presence of distal rejuvenation fragments and flakes is another key indicator of on-site production. The attributes of these specimens suggest deposition following both primary core preparation as well as from rejuvenation of previously prepared cores. Specimen x180 is an example of a distal rejuvenation removal having been recycled into a microblade core. The core features two unidirectional fronts, one of which exhibits removal traces made before the distal removal was made on the previous core, and the other front exhibiting traces of platform preparation prior to the microblade removals.

A high frequency of failed final removals was observed among the microblade core specimens. The majority of microblade cores exhibited hinged final removals, with a total of nine specimens. Five specimens exhibited ideal final removals, while another five exhibited feathered removals. Such a high frequency of failed removals among the deposited cores could be interpreted as the result of knapping errors made by novice practitioners. Besides the terminal hinge fractures, the cores exhibit traces of successful serial sequences of knapping that includes both removals for preparation as well as several successful microblade removals. These sequences are observed as highly heterogeneous. From these observations it is inferred that the raw material demanded highly expedient methods of production. Furthermore, considering the dominance of artefacts related to microblade technology, the available flake debitage is most likely associated.

A total of 19 endblade specimens were examined (9.1.1.). These have also been predominantly made from quartz crystal but includes specimens of both quartzite and MCQ. Six are intact. Several specimens furthermore demonstrate unique characteristics, pointing to their preceding circulation. These characteristics include raw material types—exemplified by a unique specimen of *killiaq*, traces of previous events of rejuvenation, and distinct component designs.

Unlike other groups of bifacial components, the examined sideblades are dominated by MCQ. Their sizes are distinctly varied, indicating that several cloven-hoof lances were maintained during the site occupation by component replacements.

A total of 15 specimens were identified as endscrapers (9.1.2.). Most of the endscrapers are made from quartz crystal, except for one specimen of quartzite and two specimens of MCQ. Most specimens are intact, with three specimens classified as long distal fragments.

The single, yet distinct, quartz crystal sidescraper examined in the present analysis clearly demonstrates how a nodule similar in size and morphology was procured in accordance to the desired component design (9.1.3.).

The single burin-like tool of the assemblage is the only one of its type identified among all the lithic assemblages from Kap Skt. Jacques (9.1.4.). As burin-like tools of quartz crystal are yet to be discovered, the possibility that the available flake debitage was deposited during the production of its replacement component is here excluded. Rather, its replacement was likely provided by a prepared component kept in portable supply.

Summary

The analysis of the lithic assemblage from Feature 101 indicates how both tool maintenance and tool kit preparation emerged differently during its site occupation, contingent on the properties of raw materials and the preceding histories of human-lithic interactions.

With the relative abundance of microblade cores and core rejuvenation flakes, the remains of microblade production are pronounced at Feature 101. The site occupants had both recently procured nodules of quartz as well as circulated the raw material as prepared microblade cores and bifacial components. Judging from the different qualities of quartz specimens, people did not exclusively procure nodules of highest quality. Instead, people expediently procured nodules of various quality before transporting them to Kap Skt. Jacques. This contributed greatly to form the considerable depositions of preforms and exhausted raw material. These depositions were primarily the result of events where quartz crystal nodules were tested and prepared into microblade cores, before numerous microblades were subsequently produced.

These events coincided with the maintenance of several composite knives; whereby multiple microblade components were deposited during component replacement. Unlike the microblades of quartz crystal produced on-site, the discarded microblades of MCQ had been produced and circulated beyond the areas adjacent to Île de France. Combined, the bifacial components predominantly indicate depositions following events of component replacement. Except for the possibility that bifacial components were produced from quartz crystal and subsequently transported away from the site, none of the quartzite or MCQ specimens had been produced here. The characteristic patterns observed between different raw materials strongly suggests that people brought tool kits to the site that were not only highly prepared, but had also

been previously re-assembled by continuous tool kit maintenance and preparation that had unfolded across a geographic area well beyond the area surrounding Île de France. Furthermore, as the analysis suggests that the properties of quartz crystal contributed significantly to relatively large waste depositions during production, the circulation of the raw material would become more limited in comparison to MCQ.

5.4.2. Feature 222

The location of Feature 222 is recorded at 11.65 m a.s.l. on a gently sloping, frost-cracked, terrace. The feature was excavated by Knuth's field assistant Tim Grønnegaard during the field season of 1989. It has been tentatively defined by a circular, cleared area about 3 meters in diameter, divided internally by a row of eight boulders which have been suggested to be the remains of a mid-passage. Located at the suggested doorway of the mid-passage a flagstone pavement is documented. A possible tent-ring is also suggested, tentatively defined by five to six boulders. The find lists of Feature 222 include a total of 14 inventoried lithic objects. Nine findings of unspecified seal bone are also described in the catalogue (Grønnow and Jensen 2003:285-286). The lithic types identified in the present analysis include microblades and flakes (Table 22). See part 9.3., Appendix C for comprehensive descriptions.

Six microblades were identified (9.3.1.). Five are made from quartz crystal, while a single specimen is made from a black type of MCQ. The quartz crystal microblades include three specimens with retouch and two without. A single retouched specimen exhibits a dorsal surface with traces of cresting from core front preparation, suggesting that it was hafted into a composite

Table 22: Lithic types and raw materials identified in the assemblage from Feature 222.

Feature 222	Microblades	Flakes	SUM
MCQ			
White		3	3
Black	1		1
QC			
n/a	5	4	9
SUM	6	7	13

Table 23: General size measurements and raw material composition of examined flake debitage from Feature 222.

Feature 222	0-1 ² cm	1-2 ² cm	2-3 ² cm	SUM
MCQ				
White		3		3
QC				
n/a	2	1	1	4
SUM	2	4	1	7

tool rather than produced on-site. A single microblade of black MCQ is unique to the lithic assemblages from Kap Skt. Jacques. It is highly similar to the black type observed among lithic assemblages from northernmost Greenland. The observable raw material similarities might suggest an inter-regional link between this region and Île de France. However, the lack of similar MCQ at Kap Skt. Jacques makes it impossible to draw any certain conclusions on this.

Based on the general sizes and raw material types observed among the few flakes (9.3.2., Table 23), no direct association to the deposited microblades could be established. Three similarly sized flakes of MCQ suggests that a bifacial component was rejuvenated at the site. The varied sizes of available quartz crystal flakes might suggest that deposition following a short sequence of microblade production.

Summary

The scant assemblage of lithic remains suggests a highly brief episode of tool maintenance during the site occupation of Feature 222. This primarily involved the replacing of components by prepared supplies. Limited sequences of knapping removals from quartz crystal is also inferred, presumed to have occurred during component rejuvenation or minor preparation removals during microblade production. The novel black type of MCQ identified from a single microblade indicate that the person(s) occupying the site had previously procured lithic raw materials and prepared tools in an area outside of the region.

5.4.3. Feature 226

Located on a raised area 11.99 m a.s.l., Feature 226 is tentatively defined as a cache without other structural remains. The artefacts were found in a concentration around and below a red boulder next to a 20 cm in diameter darkly stained area. The stained area is interpreted as the remains of a decomposed bag that contained the raw material and tools (Grønnow and Jensen 2003:286-287). However, the lack of any physical evidence beyond the stained soil makes this highly speculative. The definition of the small area as a cache, on the other hand, is substantiated by the complete lack of flake debitage material. Lithic types identified in the present analysis include microblade cores, endscrapers, and sidescrapers (Table 24). See part 9.4., Appendix C for comprehensive descriptions, and part 12.2., Appendix F for artefact illustrations.

The three bifacial components include two endscrapers (9.4.1.) and a single sidescraper (9.4.2.). While it was possible to distinguish the lithic type of each respective specimen, they exhibit unusual characteristics. Unique characteristics include morphology and component design.

Six microblade cores were examined. While only three are listed in the find inventory, the discrepant number is due to three large flakes/roughouts being re-classified as microblade cores. Each of the microblade cores exhibits the common keeled core morphology. Their sizes vary from 15,5 to 29,1 mm in length, 12,6 to 19,7 mm in width, and a thickness between 13,8 to 31,8 mm.

The microblade cores each feature a single removal front, with number of removals ranging from a single to seven removals in total, at angles mostly around ~70-80°. An ideal final removal is only observed on Specimen x280. The others, however, each indicate that the final removal of their fronts was the result of unsuccessful knapping. Two specimens feature negative removal scars of hinged fractures, two with feathered removals, and one featuring a negative scar of a plunged removal. The diverse attributes among the microblade cores makes it difficult to ascertain if the

Table 24: Lithic types and raw materials identified in the assemblage from Feature 226.

Feature 226	Microblade cores	Endscrapers	Sidescrapers	SUM
MCQ				
White		1		1
Light brown (banded)		1		1
QC				
n/a	6		1	7
SUM	6	2	1	9

artefacts were indeed cached as previously suggested, or if they were deposited after becoming redundant.

Summary

The present analysis indicates that the lithics deposited at Feature 226 were highly prepared prior to the site occupation and their deposition. The fact that several microblade cores exhibit traces indicating failed removals makes the absence of flake material even more curious. It thus appears that people indeed brought the objects in such states to the site. In the case of the microblade cores, it can be speculated that these were deposited as a cache due to the inability (actual or perceived) of the visiting persons to make proper use of the raw material. To reduce the amount of portable supplies, they might then have decided to cache the objects in case another group would find it and be able to make use of the material.

5.4.4. *Feature 243*

Feature 243 is defined as a mid-passage tent-ring, measuring 3 x 2,9 m, and located 21 m a.s.l. near the prominent edge of a terrace on the northern side of the point. The feature is disturbed, with only its northeastern periphery preserved. While there are no structural remains of a hearth, the possible presence of an open fire is suggested by the presence of burnt MCQ found in front of the supposed doorway to the south of the tent ring.

Lithic types identified in the present analysis include endblades, endscrapers, sidescrapers, microblades, and flakes (Table 25). See part 9.5., Appendix C for comprehensive descriptions, and part 12.3., Appendix F for artefact illustrations.

A total of 35 microblades were examined (9.5.4.). The microblades of MCQ are among the most homogenous in terms of raw material types available from Kap Skt. Jacques. Sixteen specimens of MCQ were identified, of which twelve were classified as retouched microblades, four as unretouched microblades, and a single specimen with considerable coverage of cortex (~25%). All except a single intact specimen were fragmented, including the following types: five long proximal, one short proximal, four long distal, and one medial. None of the specimens were possible to refit. The corticated specimen suggests that some primary stages of microblade knapping occurred at the site, but most specimens featuring retouch suggesting that the microblades of MCQ were predominantly deposited following component replacement.

The seventeen microblade specimens of quartz crystal exhibited more heterogenous attributes. Five of the specimens were intact, with the remaining specimens including four long proximal, one short proximal, three long distal, and one medial fragment, respectively—none of which could be refitted. Only three specimens exhibited neither retouch nor traces of core preparation. The remaining fourteen microblades exhibited retouch for hafting, including the traces of core preparation. Only a single specimen featured traces of core front preparation without retouch. Compared to those made from MCQ, the microblades of quartz crystal indicate depositions both from events of component replacement as well as microblade production.

Table 25: Lithic types and raw materials identified in the assemblage from Feature 243.

Feature 243	Microblades	Microblade cores	Endblades	Endscrapers	Sidescrapers	Flakes	SUM
MCQ							
White	13					10	23
White-grey	2					2	4
Red-white	1						1
Grey						3	3
Grey (spotted)						2	2
Dark grey						5	5
Light brown						8	8
Red-brown						1	1
Brown-grey					1	1	2
n/a	2						2
QC							
n/a	17	4	1	1		75	98
Quartzite							
Light grey			2				2
SUM	35	4	3	1	1	107	151

170 Gatherings at the edge of the Polar Sea

Table 26: General size measurements and raw material composition of examined flake debitage from Feature 243.

Feature 243	0-1 cm ²	1-2 cm ²	2-3 cm ²	3-4 cm ²	SUM
MCQ					
White		10			10
White-grey		1		1	2
Grey		2	1		3
Grey (spotted)		1	1		2
Dark grey		2	3		5
Light brown	1	7			8
Red-brown		1			1
Brown-grey				1	1
QC					
n/a	13	58	4		75
SUM	14	82	9	2	107

A single endscraper (9.5.2.) and sidescraper (9.5.3.) were identified. Judging from its traces of cortex, the endscraper was likely made from a small natural flake of quartz crystal. It is bifacially knapped, with mildly flared edges. The sidescraper is made from MCQ and has been refitted from two fragments. It has been unifacially knapped from a large flake. The ventral surface of the preform flake, including a bulb of percussion, is still visible. This suggests that it was expediently produced prior to the site occupation, hafted into a composite tool, and eventually deposited during component replacement.

Three endblades were examined (9.5.1.). Two proximal fragments are of a similar type of quartzite, while an intact specimen is made from quartz crystal. The deposition of the two proximal fragments indicates that people had brought two separate composite tools that had broken prior to the site occupation.

The most abundant group of artefacts identified in the assemblage are flakes, including both flakes made from MCQ and quartz crystal (9.5.5.). The material of MCQ include specimens related to core preparation as well as the production and/or rejuvenation of bifacial components. Overall, the flake material of quartz crystal exhibited no distinct technological attributes allowing for association with specific types of lithic component technology. However, the generally small sizes of the flakes suggest that they were deposited following core preparations as well as component rejuvenation and production (Table 26).

Summary

Events of lithic production were prominent during the site occupation of Feature 243. The flake debitage was deposited following procedures related to the production of various component technologies both of MCQ and quartz crystal. The finished bifacial and microblade components in the lithic assemblage suggests tool maintenance, where a few fragmented and intact components were discarded following replacement. Overall, the analysis suggests that people arrived at the site with highly prepared cores and bifacial preforms, but also with a lack of prepared components. This would demand people to engage in lithic production from the available supply of prepared raw material that had been procured both locally and from beyond the region.

Whether or not the material of quartz crystal and MCQ were contemporaneously deposited is impossible to determine. However, the deposition of supposedly burnt MCQ in front of the doorway of the structural remains suggests that secondary depositions of lithic material did occur at the site. Feature 243 might therefore be considered a site of at least two occupations, both involving tool kit maintenance by groups that briefly stayed at the island.

5.4.5. *Feature 283*

The feature has been described as a well-preserved mid-passage tent ring, defined by a cleared area of approximately 4 meter in diameter with a floor bisected by a 1,8-meter-long and 40 cm wide mid-passage set of twelve vertical flagstones (Grønnow and Jensen 2003:288-289). It was located about 140 meters from the present shoreline at the southern side of Kap Skt. Jacques, set around 4-5 meters from a prominent terrace edge. A defining characteristic of Feature 283 is its position along a line of seven dwellings on a shared terrace edge, at the easternmost end. Based on detailed similarities of their spacing and construction, these dwellings have been interpreted as contemporaneous. While the presumably contemporaneous structural remains were mapped by drawing, only Feature 283 was excavated. Thus, no artefacts were collected from the other features.

21 lithic artefacts are listed as collected from Feature 283, and the same number was counted in my analysis. In their cataloguing of archival material from the excavation, Grønnow and Jensen notes minor discrepancies between the total number of flakes given in the original field report, stating 12 flakes, while find lists mentions 14 flakes. Additionally, a piece of worked bone

and a mammal tooth were collected. Lithic types identified in the present analysis include microblades and flakes (Table 27). See part 9.6., Appendix C for comprehensive descriptions.

Six microblades were identified in the site assemblage from Feature 283, corresponding exactly with the find list inventory. Four of the specimens are made from MCQ, and the remaining two from quartz crystal.

Three of the MCQ specimens have been classified as microblades with retouch for hafting, while the remaining as a standard microblade without retouch. Two of the specimens are intact, a single observed as a long proximal fragment, and a single as a short proximal fragment. The two microblades of quartz crystal include a single microblade with retouch, and a single without. The specimen featuring retouch also exhibits a minor degree of surface cortex—its dorsal surface defined by two negative removal scars and a surface with cortex. The microblades featuring retouch are here inferred to have been replaced during tool maintenance. The single specimen featuring a corticated surface indicate that it was produced briefly after its microblade core was prepared. As the available flake debitage does indicate on-site microblade production, it is inferred that this specimen was deposited as a preparation removal prior to the production of a new microblade component.

Fifteen flakes were identified in the site assemblage. The discrepancy between the identified number and the inventoried number is here considered insignificant, as it is likely the result of fragmentation during storage. Four flakes are made from quartz crystal, while eleven are made from MCQ (Table 28). The flakes of MCQ have been divided into three tentative type

Table 27: Lithic types and raw materials identified in the assemblage from Feature 283.

Feature 283	Microblades	Flakes	SUM
MCQ			
White-grey	1		1
Light grey		1	1
Brown	3	3	6
Light brown		7	7
QC			
n/a	2	4	6
SUM	6	15	21

Table 28: General size measurements and raw material composition of examined flake debitage from Feature 283.

Feature 283	0-1 cm ²	1-2 cm ²	2-3 cm ²	3-4 cm ²	SUM
MCQ					
Light grey	1				1
Brown		1	1	1	3
Light brown		3	4		7
QC					
n/a	1	3			4
SUM	2	7	5	1	15

variations. It is considered possible that the flakes are of shared provenance, if not from the same nodule.

The general size of the flakes suggests that they were removed from either a preform or a larger lithic component. The similarities among MCQ raw material types between microblades and flakes makes it possible that the flakes were deposited following microblade core preparation. From this, the microblade technology present at Feature 283 cannot be strictly regarded as a result from component replacement only, with the flake material allowing for the possibility that component production having occurred prior to the deposit of the lithic artefacts.

Summary

The lithic assemblage from Feature 283 is rather inconspicuous but allows some qualitative inferences to be made. As MCQ dominates the raw material composition of finished components, it is likely that people brought prepared component supplies from beyond the adjacent areas of Île de France. However, the presence of relatively large flakes of MCQ suggests that a few nodules or preforms of the raw material was brought to the site. By the scarce amount of such flakes it is possible that these were deposited during a brief event of raw material testing, before the preform(s) were transported away from the site. This suggests that primary production of lithic components was highly territorialised by and embedded into continuous circulation of lithic materialities. Additionally, the remains related to microblade technology can be considered the outcome of expedient maintenance of microblade knives, that involved the production of at least one new microblade.

5.4.6. Feature 291

Feature 291 is a poorly documented feature located on the central part of Kap Skt. Jacques at 15.69 m a.s.l. It is only described as a double tent ring with a mid-passage. Its size in diameter nor information regarding the state of the structural remains are described. The lithic assemblage of Feature 291 lists a total of 50 findings. No other artefact remains are listed from the feature. Lithic types identified in the present analysis includes flakes, microblades, a microblade core, and an endblade (Table 29). See part 9.7., Appendix C for comprehensive descriptions, and part 12.4., Appendix F for artefact illustrations.

The deposition of a single endblade (9.7.2.) at the site was likely an outcome of tool maintenance. The specimen indicate that it had been in circulation for some time by its possible traces of component rejuvenation. As the assemblage include no flake debitage indicative of bifacial component production or rejuvenation, it is inferred that it was replaced by a prepared component kept in supply.

The examined microblade core (9.7.3.) provides evidence of on-site microblade core preparation. rejuvenation procedure. Although no direct link between the artefact and the find list is available, it is likely that Specimen x499 represent the finding listed as a microblade core in the catalogue due to its technological characteristics. Technically, it is not a microblade core, but a distal core rejuvenation removal. Only a single front with a single negative microblade removal scar is discernible on the specimen, suggesting that the removal was made from a core in an early stage of production. The remaining cortex (~20%) on the specimen further indicate this.

Table 29: Lithic types and raw materials identified in the assemblage from Feature 291.

Feature 291	Microblades	Microblade cores	Endblades	Flakes	SUM
MCQ					
White-grey	1				1
Light grey			1		1
Light brown	2				2
Black	1				1
QC					
n/a	9	1		34	44
Dolerite					
Black				1	1
SUM	13	1	1	35	50

Table 30: General size measurements and raw material composition of examined flake debitage from Feature 291.

Feature 291	0-1 cm ²	1-2 cm ²	2-3 cm ²	SUM
QC				
n/a	22	12	2	36
Dolerite				
Black			1	1
SUM	22	12	3	37

A total of 13 microblades were identified in the site assemblage (9.7.1.). Overall, only four microblades were classified as standard microblades without retouch. The remaining specimen each feature retouch which strongly suggest that they had been circulated as hafted components. Nine specimens have been made from quartz crystal, while the remaining four are made from MCQ of different types. The raw material of the microblade made from black MCQ is similar to the type known from northernmost Greenland.

Traces of core preparation are frequently observed among quartz crystal microblades present in the assemblage. One quartz crystal microblade features a fully crested surface, three with a single removal scar and a single crested surface, and one with two removal scars and one corticated surface. Four of the specimens are intact, while the remaining specimens were classified as long proximal (2), short proximal (2), long distal (1), and medial (1). Each of the specimens exhibiting traces of microblade core preparation features retouch, with only three specimens in total exhibiting no such attributes. From this, it is inferred that the specimens were deposited during tool maintenance, and that they had been produced from recently procured cores. However, the presence of retouch on each of the ‘preparation blades’ suggests that these were not produced on-site. Although it is difficult to ascertain if quartz crystal microblade production occurred at the feature, the single distal microblade core rejuvenation removal from a microblade core provides some evidence that such episodes occurred.

The four microblades of MCQ exclusively exhibits dorsal surfaces with negative blade removal scars, and thus provides no indications suggesting that they were produced on-site. Three of the specimens are intact, while a single has only retained its proximal area. The specimen of black MCQ feature retouch, indicating that the originally intact specimen was used as a hafted component. Of the three intact specimens, only one is without any retouch. As with the retouched

microblades of quartz crystal, these had likely circulated as part of composite tools prior to their deposition during tool maintenance.

The absence flakes of MCQ suggest that no production of microblades or preparation of microblade cores from the raw material occurred at Feature 291. As light brown and white-grey MCQ has been observed in other microblade assemblages from the cape, it is possible that the specimens are connected on a regional (by geological provenance) or local scale (by spatial distribution of production).

Most of the artefacts identified in the site assemblage from Feature 291 were flakes, numbering a total of 37 specimens (9.7.4.). Each of the flakes, except for a single specimen of dolerite, were identified as quartz crystal (Table 30). Most of the specimens were not possible to distinguish according to specific types of lithic production, but three flakes were classified as core rejuvenation flakes based on the traces of regular removal ridges on their dorsal surfaces. The remaining flake material were generally smaller, with attributes that cannot be confidently associated to specific 'type' of lithic production. They might be associated to the production of microblades, based on the examination of other available quartz crystal types from the site feature. As such, the flake assemblage here corroborates the inferences made from the microblades and the microblade core.

Summary

The lithic assemblage was formed by a brief event that involved lithic component replacement and production as well as preform preparation. Comparing the technological attributes of MCQ and quartz assemblages indicate that the MCQ been circulated as part of tools and tool kit supplies for some time, whereas quartz had been recently procured. Artefacts of MCQ were deposited during events of component replacements. The deposition of artefacts made from quartz crystal are inferred as the combined outcome of component replacements as well as brief sequences of component production. This suggests that people utilised recently procured nodules to produce a few fresh components of quartz crystal to replace redundant components of both MCQ and quartz crystal.

5.4.7. *Feature 305*

Located ten meters from a low terrace slope on the central part of the point at 19.14 m a.s.l, Feature 305 is described as a double tent ring with a mid-passage. The feature is made up by two conjoined tent rings at approximately 3.8 m in diameter. Both include mid-passages built of four pairs of vertically placed flagstones. Appropriately, the tent rings are separated as 305a and 305b, positioned to the north and south of each other respectively. Fragments of burnt bone and fire-cracked rocks have been recorded from the mid-passages. The superimposition of flagstones from feature 305a over fire-cracked rocks from 305b suggests that the two dwelling remains represents two separate occupations.

The immediate proximity of the feature includes three open-air hearths 3-8 meters to the north, a badly preserved mid-passage feature (Feature 412) to its southwest, and a large boulder with a large quantity of flakes of a green quartzite type circling a large boulder to its west by approximately five meters (Feature 402). The available documentation does not refer to any collection of artefacts from the surrounding features.

The site assemblage inventory lists a total of 55 lithic artefacts. No specific information is available regarding where in the feature the artefacts were collected. As such, it is impossible to designate the objects to neither part A nor B of feature 305. Considering the suggested chronology of the feature, it is therefore impossible to assign the artefacts to either occupation episode. In addition to the lithic material a total of 38 pieces of seal bone was retrieved; 9 of ringed seal and the remaining of unspecified seal species. Lithic types identified in the present analysis include microblades, sideblades, and flakes (Table 31). See part 9.8., Appendix C for comprehensive descriptions.

A notable characteristic with the lithic assemblage of Feature 305 is that it is comprised entirely of artefacts made from MCQ. A total of 18 microblade specimens were identified in the assemblage collected from Feature 305. The technological attributes of the microblades corresponds well with the typical Greenlandic Dorset microblade pressure-blade technology. Most of the specimens are made from a homogenous light brown MCQ. Six of these were found intact. Four specimens were classified as long proximal fragments; three as medial fragments; and a single as a long distal fragment. None of individual specimens could be refitted. The remaining microblades several different types of MCQ. The white-grey specimen is the only one of these that has remained intact as well as exhibiting dorsal traces of core front preparation. The grey and blue-white specimen are both medial fragments, while the brown-grey is classified as a long proximal fragment. None of the four exhibited traces of retouch.

Table 31: Lithic types and raw materials identified in the assemblage from Feature 305.

Feature 305	Microblades	Sideblades	Flakes	SUM
MCQ				
Blue-white	1			1
White-grey	1		3	4
Grey	1		1	2
Brown-grey	1			1
Brown		1		1
Light brown	14		25	39
Red-brown			1	1
Black			1	1
Dolerite				
Black			1	1
SUM	18	1	32	51

Table 32: General size measurements and raw material composition of examined flake debitage from Feature 305.

Feature 305	0-1 cm ²	1-2 cm ²	2-3 cm ²	SUM
MCQ				
White-grey		3		3
Grey		1		1
Light brown	6	18	1	25
Red-brown		1		1
Black		1		1
Dolerite				
Black		1		1
SUM	6	25	1	32

The assemblage of flakes collected from Feature 305 is almost exclusively made up of MCQ (Table 32). Only a single small, polished flake of what seems to be slate/dolerite-like material is the exception. Most of the flakes are of a light brown type of MCQ, recognised in several other assemblages from Kap Skt. Jacques. In addition to these the remaining flakes included a white-grey type (3), one of red-brown, one of grey, and one made from a black type of MCQ. Few of the flakes exhibited any attributes associable to distinct sequences of lithic production. The single slate-like specimen is most distinct by its traces of polish that likens it to adze rejuvenation flakes commonly observed among assemblages from Qeqertarsuup Tunua.

The relative abundance of light brown MCQ in the collected flake assemblage (9.8.3.) suggests that microblade production from a single microblade core occurred at the site. Specimens x388, x390, and x391 exhibit traces related to core preparation. Specimen x391 exhibits attributes suggesting that it was a removal made to correct a plunged microblade removal front, while the attributes on Specimen x388 suggests that it was made from the distal area of a microblade core. A single flake of the same raw material type exhibited bifacial removal scars suggesting that it was deposited following rejuvenation of a bifacially shaped lithic component.

Summary

Overall, a variety of events that emphasised on-site maintenance of various tools can be inferred from the present analysis. These involved the production of fresh microblade components from a prepared microblade core, the rejuvenation of a single dolerite item—possibly an adze—and the replacement and rejuvenation of a few bifacial components. While the single sideblade is inferred

as having been replaced by a previously prepared component, deposited microblades are inferred as having been replaced by components produced at the site. These fresh components were produced from a microblade core that had been partially prepared prior to the site occupation, and that had possibly been procured beyond the immediate areas surrounding Île de France. The microblade core was subsequently transported away after the site occupation.

5.4.8. *Feature 363*

Feature 363 is defined as a cultural layer without any evident structures. The available documentation gives only an approximate location of the site: About a few hundred meters from the tip of Kap Skt. Jacques, around 25 meters from its southern shore at 2.5 m a.s.l. The excavation of the area was prompted by the visible abundance of artefacts in the area during survey, dominated by lithic artefacts—all of which are of quartz crystal except a single microblade of chert. The site assemblage also includes twelve artefacts of organic material of bone, wood, and ivory. Bone artefacts include six pointed objects; two ivory artefacts described as a pointed object and an awl; while the described wooden artefacts include one flat wooden piece with a hole, an oval wooden lid, and two wooden pegs (Grønnow and Jensen 2003:291-292).

The frequencies of different artefact types are in the present analysis discrepant from the available inventory. This is primarily due to several objects being re-assigned to different type categories. It is predominantly among flakes that artefacts more appropriately placed elsewhere were identified. The lithic types identified in the present analysis includes flakes, microblades, endblades, a sideblade, endscrapers, microblade cores, and nodules/preforms (Table 33). See part 9.9., Appendix C for comprehensive descriptions, and part 12.5., Appendix F for artefact illustrations.

Although the find inventory does not list any artefacts as preforms, ten large nodules and preforms were identified in the site assemblage from Feature 363. The specimens have been made from sizeable nodules of quartz crystal and quartzite, none of which have been assigned individual ID labels. The measurements of the artefacts range from 12 to 71,6 mm in length, 16,4 to 38,4 mm in width, and 10,9 to 32 mm in thickness. Classifying the raw material types among the artefacts was made difficult due to the varying quality of the raw material. Typically, quartz crystal is associated with a clear, translucent crystal structure, but several of artefacts identified as QC were resemblant to quartzite due to their shattered internal structure.

Table 33: Lithic types and raw materials identified in the assemblage from Feature 363.

Feature 363	Microblades	Microblade cores	Endblades	Sideblades	Endscrapers	Preforms	Flakes	SUM
MCQ								
White-grey					1			1
Light grey				1			2	3
Brown					1			1
QC								
n/a	8	8	5		5	9	39	74
Quartzite								
White-grey						1		1
Blue-grey			2					2
SUM	8	8	7	1	7	10	41	82

While mostly exhibiting arbitrary technological attributes, the preforms (9.9.6) were divided into several types. Five specimens were classified as core preforms, whereby two exhibited traits associable to the shaping of keeled microblade cores. The discernible technological attributes on the remaining three cores did not allow specific classification. A single preform was impossible to classify as either a preform for a core or a bifacial component. Three specimens were identified as possible endblade preforms by their morphology and a few disparate traces of bifacial removals.

The deposit of the preforms appears not as the result of caching, but rather as a result of raw material testing and failed preparation. Four of the preforms exhibits severe hinge fractures that likely expended their potential for continued knapping. Whether these fractures were caused by poorly executed knapping or poor raw material quality is difficult to determine. The largest preform specimen of quartzite (l: 71,6; w: 37; t: 13,4), however, is an example of what might be considered failed knapping as a consequence of raw material properties. Most of its surface is natural, and the relatively few attempts at flake removal have resulted in hinged removals. Judging from the grained raw material structure of the artefact, which is quartzite-like in appearance, these failed removals were likely made as expedient attempts at shaping a nodule with dubious potential. Interestingly, it seems like the removals were focused on the area of the nodule with a translucent, QC-like structure.

The technological attributes of preforms and prepared microblade cores indicate both the challenges of knapping quartz crystal and the skill of knappers working with the material. From this, one can question the premises for inferring skilled production from quartz crystal and quartzite. As has been mentioned earlier, these types of lithic material represent among the more

Table 34: General size measurements and raw material composition of examined flake debitage from Feature 363.

Feature 363	0-1 cm ²	1-2 cm ²	2-3 cm ²	SUM
MCQ				
Light grey			2	2
QC				
n/a	2	19	18	39
SUM	2	19	20	41

difficult raw materials for production of lithic tool components—at least in a Greenlandic context. Estimating relative degrees of skilled production is thus problematic, seeing as the technological attributes may be highly influenced by the properties of the raw material rather than the technical proficiency of knappers.

Flake material collected at the site suggests that sequences of lithic production contributed to the deposition at feature 363 (9.9.7). Numbering 41 specimens, the flakes are mostly knapped from quartz crystal, except for two flakes of light grey MCQ (Table 34).

Eight microblade core specimens with traces of successful microblade removals were identified. The specimens include six intact microblade cores with a keeled morphology, as well as two large core rejuvenation flakes. Except for a single specimen with a plain platform, the intact cores exhibit platforms with several preparation removals.

The number of microblade removal scars as well as removal fronts vary between the intact specimens. Three specimens feature only a single front, two specimens with dual fronts, and a single triple-fronted specimen. Between the individual specimens, the position and direction of removal fronts are observed as heterogenous, making it difficult to separate the cores into different categories based on this technological trait. An example of an atypical set of removal fronts is Specimen #39, with removals going in opposing directions from three separate platforms. Considering that only one of its removal fronts features more than a single removal scar, the number of separate removal fronts is arguably the result of expedient sequences of operations to accommodate raw material properties.

The two core rejuvenation flakes both feature traces of a single removal front. One specimen is a front rejuvenation flake, where a large portion of the front has been rejuvenation by a single, large removal. The other specimen is here defined as a side rejuvenation flake, as its

technological attributes suggests that a large portion at the side of the original core was removed—presumably to prepare a new front for a microblade core.

Relative to the assemblages of preforms and microblade cores, the small assemblage of microblades collected from Feature 363 is notable (9.9.4). Contrary to the lithic remains directly associated to the production of microblades, none of the collected microblades exhibit characteristics indicating that they were produced on-site, but rather of their deposit at the site following component replacement.

Finished bifacial components are relatively numerous in the lithic assemblage. Seven bifacial endblades (9.9.1), seven endscrapers (9.9.2.), and a single sideblade (9.9.3.) have here been examined. Most of these have been made from quartz crystal, but several are made of unique types of MCQ and quartzite. Each of the components strongly suggest deposition following tool maintenance. As the examination of the flake material is mostly indicative of microblade production, it is considered likely that no new bifacial components were produced on-site. Thus, the deposit of the bifacial components would have been followed by the hafting of components that had been prepared prior to the site occupation.

Summary

Whereas microblades and microblade cores deposited at Feature 363 indicate events involving both component replacements as well as microblade production, bifacial components are only indicative of component replacements. Thus, the people that occupied the site arrived at the site with both prepared supplies as well as recently procured nodules of quartz crystal. The diverse raw materials of deposited bifacial components suggest that people were already familiar to quartz crystal and its regional availability, but also that they had moved into areas where other raw materials were available. It is likely that each of the bifacial components had been prepared *before* the raw material of the microblades and microblade cores was procured. The analysis furthermore suggests that the size and shape of recently procured quartz crystal nodules was primarily suitable for microblade production, and so the events of lithic production at the site became preconditioned as such. The relatively prominent depositions of preforms indicate that only some of the procured nodules would become incorporated into portable tool kit supplies to be circulated beyond the site occupation.

5.4.9. Feature 382

Feature 382 is only defined by the collection of artefacts from an unspecified area, as it was never excavated. No description of the feature is available either. As such, contextual information derives from the site assemblage itself. Lithic types identified in the present analysis include microblades, microblade cores, endblades, preforms, and flakes (Table 35). See part 9.10., Appendix C for comprehensive descriptions.

Table 35: Lithic types and raw materials identified in the assemblage from Feature 382.

Feature 382	Microblades	Microblade cores	Endblades	Preforms	Flakes	SUM
MCQ						
White			1		1	2
White-grey	2					2
Blue-grey	1		1			2
Grey	2				9	11
Dark grey					12	12
Brown-grey	2					2
Banded brown-grey					1	1
Brown	1				1	2
Light brown	5				1	6
Red-brown			1		1	2
Black					1	1
Green	1					1
QC						
n/a	21	1		1	46	69
Quartzite						
White					1	1
Blue-grey					1	1
Dolerite						
Black					1	1
Black w/ yellow inclusion					10	10
Killiaq						
Grey					4	4
SUM	35	1	3	1	90	130

Table 36: General size measurements and raw material composition of flake debitage from Feature 382.

Feature 382	0-1 cm ²	1-2 cm ²	2-3 cm ²	SUM
MCQ				
White		1		1
Grey	3	6		9
Dark grey	5	7		12
Brown-grey (banded)		1		1
Brown		1		1
Light brown		1		1
Red-brown		1		1
Black			1	1
Quartzite				
White		1		1
Blue-grey	1			1
QC				
n/a	14	29	3	46
Dolerite				
Black		1		1
Black w/ yellow inclusion	4	6		10
Killiaq				
Brown		4		2
SUM	27	59	4	90

The site assemblage collected from Feature 382 include a total of 35 microblades, five more than has been inventoried in the list of findings (9.10.2.). The microblades are composed of specimens made from quartz crystal and MCQ, the former numbering 21 specimens and the latter 14. Several types of MCQ were identified. The microblades of quartz crystal include only three intact specimens. The fragmented assemblage includes short distal (4), long proximal (5), long distal (3), and medial fragments (6). A total of 5 retouched specimens were identified. The remaining specimens featured unretouched microblades and a single preparation microblade removal. Judging from the raw material availability and frequency among microblades and flakes, it can be inferred that several composite microblade knives were maintained at the site. Replacement components were provided by on-site microblade production.

Specimen x502, catalogued as a large flake/rough-out, was classified as a core preform of quartz crystal (9.10.5.). It is large a specimen, measuring 51,2 mm in length, 33,5 mm in width, and 17,5 mm in thickness. Its irregular removals were most likely made for preparation. However, several hinge fractures observed on its surface suggests that this preparation eventually failed. The specimen suggests that recently procured raw material was brought to the site. The preform—along with the dominant number of quartz crystal microblades—makes it more conceivable that the available flake material of quartz crystal was predominantly deposited during microblade production.

The three endblades examined in the present analysis have all been made from MCQ (9.10.1.). Their technological attributes indicate that they were deposited as fragmented, finished components. Two specimens have been classified as being short distal fragments, and the remaining as a short proximal fragment. Due to the lack of fieldwork documentation on the collection of the artefact assemblage, it is impossible to determine if the fragments were deposited without their associated pieces. The lack of associable raw material types in the flake material suggests that no attempts at rejuvenation were made, and thus they were replaced by prepared components kept in supply (Table 36). The inference that the flake material was predominantly deposited by events of microblade production supports this. However, a few flakes of various MCQ types suggests that a few bifacial components were rejuvenated and subsequently transported away from the site.

Summary

Despite the lack of contextual information from Feature 382, the present analysis indicate that its site occupants were involved in both tool maintenance and raw material preparation at the site. The components of several different composite tools were replaced and rejuvenated. Whereas microblades were produced on-site, replacements for bifacial components would likely have been provided by the tool kit supplies that people prepared prior to the site occupations. Furthermore, the failed preform deposited at the site indicate that people also brought untested raw material to the site.

5.4.10. *Feature 426*

The only defining aspect of Feature 426 is its concentration of lithic artefacts. Their abundance and aesthetics prompted Knuth to name the feature ‘Skatkisten’— the Treasure Chest. Scattered remains of flagstones are found in the vicinity that could have been associated with the artefact concentration at some point before being displaced. No distinct spatial patterning has been recorded.

The artefact assemblage includes both lithic and organic material remains. The find inventory lists a large number of collected artefacts from Kap Skt. Jacques, totalling 325 objects. Described organic artefacts include four pointed objects of bone, two wooden pieces likened to blubber pounders, a wooden stick with grooves at either end for lashing, as well as a piece of bone with a hole at either end. The faunal inventory lists a total of 42 pieces of bone predominantly from seal—ringed seal and unspecified—but also pieces of polar bear and muskox.

Feature 426 includes among the widest variety of lithic component types among available assemblages from Kap. Skt. Jacques. Lithic types identified in the present analysis include microblades, microblade cores, endblades, sideblades, endscrapers, preforms, and flakes. See part 9.11., Appendix C for comprehensive descriptions, and part 12.6., Appendix F for artefact illustrations.

A total of 38 microblades were examined (9.11.4.). 29 of these are made from quartz crystal, while the remaining nine specimens are made from different types of MCQ. Eleven specimens are intact, nine of quartz crystal and two of MCQ. None of the fragmented specimens could be refitted.

Nine quartz crystal microblades exhibit traces of front cresting. Two of these also include traces of cortex. None of these features any traces of hafting retouch, suggesting that these were deposited during on-site production of microblades. This inference is further substantiated by the proportionally high number of irregular dorsal surfaces among other specimens. Only a single specimen of MCQ exhibited traces of cresting indicative of core preparation. The proportionally higher number of retouched specimens of MCQ suggests that most of these, if not all, had previously been hafted into composite knives. Their deposition would therefore have resulted from component replacements.

An astounding number of 47 individual microblade core specimens were identified (9.11.5.). Most of these are of quartz crystal. Only two specimens have been produced from MCQ. A notable amount of distal rejuvenation removals was observed in the assemblage. These remains are considered strong evidence of on-site microblade production. However, comparing the technological characteristics between specimens of quartz crystal and MCQ indicates that the microblade cores of MCQ had circulated as highly prepared cores for considerable time prior to the site occupation. As the characteristics of quartz crystal specimens indicate earlier stages of production following their nodule state, it is inferred that these had been procured more recently. However, considering that preforms and microblade cores of quartz crystal are generally similar in size, it is inferred that only limited serial production was allowed by the raw material before cores

Table 37: Lithic types and raw materials identified in the assemblage from Feature 426.

Feature 426	Microblades	Microblade cores	Endblades	Sideblades	Endscrapers	Preforms	Flakes	SUM
MCQ								
White						1	2	3
White (spotted)							1	1
White-grey	1		1	1			2	5
White-grey (green band)	1							1
Blue-grey			1				1	2
Blue-grey (banded)			1					1
Grey	2				1	1	2	6
Light grey	1	1	1					3
Red-grey		1						1
Red-grey (spotted)			1					1
Brown-grey	3		1			1	1	6
Brown-grey (banded)							1	1
Spotted blue/brown						1		1
Brown	1				1			2
Light brown							2	2
QC								
n/a	29	45	11	1	9	5	175	275
Quartzite								
White			3			1	2	6
Grey			2					2
Dark grey			1					1
SUM	38	47	23	2	11	10	189	320

Table 38: General size measurements and raw material composition of flake debitage from Feature 426.

Feature 426	0-1 cm ²	1-2 cm ²	2-3 cm ²	3-4 cm ²	SUM
MCQ					
White		2			2
White (spotted)		1			1
White-grey		1	1		2
Blue-grey		1			1
Grey	2				2
Brown-grey			1		1
Brown-grey (banded)			1		1
Light brown	1	1			2
QC					
n/a	12	139	23	1	175
Quartzite					
White		1	1		2
SUM	15	146	27	1	189

were exhausted. This would in turn limit the circulation of quartz crystal microblade cores relative to those made from MCQ.

The flake material predominantly indicate production both of and from microblade cores (9.11.6). On the other hand, technological attributes and the diversity of raw material types among flakes of MCQ specimens suggests that they were deposited following brief sequences of component rejuvenation or production (Table 38). Only two pieces of quartzite was identified in the flake assemblage: One fragment with bifacial removal scars, and one flake. The fragment suggests that a hafted quartzite component was rejuvenated during the site occupation.

A total of 23 lithic endblades were identified in the site assemblage (9.11.1.). Most have been made from quartz crystal, numbering eleven specimens. In addition, the assemblage includes six endblades of MCQ and six of quartzite. The raw material composition and the technological attributes of the endblades indicate that these were deposited following considerable circulation as hafted into composite tools across landscapes with different raw material availability.

Summary

Considered along with its additional archaeological assemblage, the examined lithic assemblage indicates that depositions at Feature 426 occurred during a site occupation where people had

brought a considerable amount of resources to the island. A variety of activities ensued that would involve the processing of game as well as considerable efforts into tool kit preparations.

Notably different patterns were observed between different categories of raw material, where artefacts of MCQ and quartzite were predominantly deposited following brief events of component rejuvenation and replacement. The lack of debitage from either category of raw material suggests that no primary production of new components from these materials occurred at the site. Conversely, the abundance of quartz crystal debitage is highly indicative of on-site primary production of new microblade components from recently procured nodules. The analysis suggests that the natural size and morphology of the recently procured quartz crystal was most accommodating for microblade production. This production not only entailed the production of microblade cores specifically, but also the production of highly prepared microblade cores from which additional microblades could be produced from in the future.

5.4.11. Feature 428

The feature is defined only as an artefact concentration, distributed across a 2.1 meter in diameter area, cleared of larger stones. The feature includes several small—some fire-cracked—flat stones scattered around the cleared area. Its site inventory lists a total of 24 lithic artefacts, while faunal remains is only made up of four bones of unspecified seal. Lithic types identified in the present

Table 39: Lithic types and raw materials identified in the assemblage from Feature 428.

Feature 428	Microblades	Microblade cores	Endblades	Sideblades	Sidescrapers	Flakes	SUM
MCQ							
White			1				1
Grey	2						2
Light grey			1			1	2
Dark grey						3	3
Brown					1		1
QC							
n/a	2	1	3	1		6	13
Quartzite							
White						1	1
Blue-grey			1				1
SUM	4	1	6	1	1	11	24

analysis include microblades, microblade cores, endblades, sideblades, sidescrapers, and flakes (Table 39). See part 9.12., Appendix C for comprehensive descriptions, and part 12.7., Appendix F for artefact illustrations.

Four microblades were identified and examined (9.12.1.). Two have been made from quartz crystal, and another two from MCQ—both of a grey type. Only one of the MCQ specimens are intact, with the remaining specimens including two medial fragments and a long distal fragment. The fragmentation allows only limited observations of technological attributes. However, observable attributes suggest that the specimens are the remains of regular microblades with traces of negative blade removals on their dorsal surface. These are inferred as depositions made during events involving component replacement.

The intact microblade of quartz crystal, x421, is the exception, with traces of cortex suggesting that it was removed from a microblade core during initial stages of production following nodule procurement that occurred prior to the site occupation. The dominant, yet scarce, remains of quartz crystal flake debitage might suggest highly brief sequences of microblade core preparation and microblade production (Table 40). It is possible that this scarcity is due to limited excavation of the site feature.

However, evidence of on-site microblade core preparation is provided by the single microblade core (9.12.2). It is here identified as a distal rejuvenation flake with corticated surface, suggesting that the rejuvenated core was recently procured. Interestingly, it also features traces suggesting an expedient but failed attempt to ‘recycle’ the distal rejuvenation flake into an additional microblade core.

Table 40: General size measurements and raw material composition of flake debitage from Feature 428.

MCQ				
Light grey		1		1
Dark grey	2	1		3
QC				
n/a	3	3		6
Quartzite				
White			1	1
SUM	5	5	1	11

As with most of the available microblades, the bifacial components deposited at Feature 428 suggests depositions following component replacements. The single, fragmented sidescraper of MCQ (9.12.3.); the single, fragmented sideblade of quartz crystal (9.12.4.); and 6 endblades (9.12.3.). The endblades include specimens of quartz crystal, MCQ, and quartzite. Only the two specimens of MCQ are intact. One of the MCQ specimens feature a large amount of cortex (~40%), indicating that it was made from a small nodule similar in size to the component design. The lack of associable flake debitage suggests that up to six individual composite tools were maintained through component replacement during the site occupation.

Summary

Combined with the faunal remains, it appears that the feature was formed during a brief warm-season occupation following movements across the regional landscape involving sea-mammal hunting and the procurement of lithic raw material. The present analysis has indicated events of both tool maintenance and lithic production. The former is mostly indicated by the available bifacial component types, while the latter is indicated by the remains of microblade technology. Lithic production involved brief sequences of microblade core preparation, both for on-site microblade production as well as to prepare a tool kit for future component production. The inferred event would have involved quartz crystal that had been recently procured. The analysis suggests that its brief event of lithic production would have been highly contingent on the events of lithic procurement that preceded the site occupation. As no traces of bifacial production was observed, the dominance of quartz crystal bifacial components suggests that people were already familiar with the availability of the regionally available raw material. This in turn suggests that the site occupation was formed by people revisiting the region, if not Kap Skt. Jacques.

5.5. Discussion

The final case-study of this thesis has attended to some of the most understudied lithic assemblages from the Greenlandic Dorset period. This has provided the first comprehensive re-examination of the Kap Skt. Jacques site at Île de France. While the abundance of structural remains speaks to the site as a location for numerous visits by people, the Relational Approach makes it possible to interpret the the nature of these visits. A key element to the emerging perspective is that the history of habitation of Île de France was influenced by different temporalities of lithic component

production and maintenance. Among the crucial factors influencing these temporalities were the contingent relations between lithic raw materials, tool kits, and people.

The assemblages indicate a multitude of different stages of component production and maintenance. Finished components had not been produced *in situ* but were deposited as they were replaced during tool kit maintenance. The exception are assemblages of lithic remains associated with microblade technology that indicate protracted sequences of microblade production. These remains allow us to infer a range of historically unique human-material relations.

For the people that occupied Île de France during the Greenland Dorset, specific lithic components were already being selected during raw material procurement. This is notable among lithic remains associated with microblade technology. Assemblages of nodules and microblade cores of quartz indicate that the regionally procured raw material were generally of smaller sizes that mostly suited the precise and serial knapping of microblades. Therefore, the regionally available quartz primarily afforded the production of microblade cores and components. The large amounts of unprepared nodules and microblade cores with few microblade removals, indicate that the selective process of suitable raw material did not end at the procurement site, but continued through core preparation and component production.

The heterogenous quality of regionally available quartz was also important to the formation of lithic deposits at the site. The proportionally high frequency of preparation and rejuvenation removals among quartz microblade specimens indicate that knappers would have to accommodate and respond to the physical properties of quartz more frequently than during microblade production from MCQ. While the notable amount of quartz specimens featuring traces of knapping errors might indicate inadequate skill (cf. Milne 2012), the large proportion of preparation and rejuvenation removals suggests that site occupants were in fact highly capable of methodically and expediently executing knapping procedures. The heterogenous but generally dense qualities of quartz demanded a higher degree of skill to achieve successful production (Driscoll 2011:743; Rodríguez-Rellán 2016:203-204; Tallavaara, et al. 2010:2447-2448). In the assemblages of quartz from Kap Skt. Jacques, this is best recognised by the diverse technological attributes seen among lithic remains associated with microblade technology. Most notable are the varying numbers and positioning of removal fronts along with the large amounts of fragmented remains. Production from quartz was a challenging task that demanded flexibility during sequences of pressure-flaking

removals. This increased the chance for failed knapping operations, contributing to the excessive depositions of quartz at the site.

Furthermore, the proximity between Kap Skt. Jacques and known sources of quartz limited the circulation of regionally procured quartz. Instead of transporting untested nodules across longer distances, the proximity of an island that was clearly a desirable social gathering site allowed people to test and selectively process recently procured nodules. As such, people could simultaneously mitigate the risk of wasting the raw material of highest quality at the procurement site while preparing suitable nodules to become part of portable tool kit supplies. This would be beneficial for prudent tool kit strategies of highly mobile people that never became exclusively reliant on specific lithic raw materials. Familiarity to the availability and qualities of specific raw materials could not be taken for granted. Emphasising lithic production at procurement sites would therefore be wasted opportunities to share experiences and the development of skills required for particular raw material types.

Having now focused primarily on the assemblages of microblade technology at Kap Skt. Jacques, a new perspective on the human history of the island begins to emerge. We can already recognise how interplaying contingencies of material properties, raw material availability, and tool kit strategies of people helped shaped the human history at Île de France. This perspective can be further elaborated by discussing the distinct but less prominent lithic materialities in the available assemblages.

Overall, bifacially shaped components feature the widest diversity of lithic raw material types. These include MCQ, quartzite, quartz, and *killiaq*. Whereas remains of quartz associated with microblade technology appears to have been procured and produced locally, bifacial components strongly suggest depositions following far-reaching circulation. An important presumption here is that raw material sources of MCQ and quartzite were further away from the island than those of quartz. By the time objects of such raw material reached the site, they had already been involved in continuous processes of tool kit curation. As a result, they were deposited as intact or fragmented components in finished forms rather than during stages of component production. Thus, the deposition bifacial components at Kap Skt. Jacques was significantly contingent on tool kit preparations that preceded the site occupations at Île de France.

The dominance of quartz at the site was not an outcome of a regionally based preference for the raw material, but due to historically different relations between people and raw materials;

relations that were significantly constituted by portable tool kits. The profound ability to diversify lithic raw material use at the time was therefore significantly constituted by tool kits and tool kit curation strategies.

For people living at Île de France during the Greenlandic Dorset, raw material diversification and prudent curation of portable tool kits helped ensure that diverse lithic raw materials could be made into formalised component types. With material-material relations being strongly preconditioned by composite tool kits, the groups of people that briefly visited the island could not afford to modify component designs unless completely new composite tools were made. Instead, people maintained a pragmatic attitude to the use of lithic raw materials.

By comparing assemblages of different raw materials, the lithic remains from Kap Skt. Jacques indicate the ‘organisational continuum’ (Manninen and Knutsson 2013:94) of their local raw material economy. While procurement of raw material was made expediently, it was still structured by projections of how nodules could accommodate production of particular components (including microblade cores). Excessive amounts of raw material were subsequently transported to Île de France, where multiple people could participate in primary production to prepare new components. During production from quartz at Kap Skt. Jacques, these activities were influenced by its heterogeneous material qualities. They were also influenced by choices made in accordance to transportation cost, hafting components, and lithic component supplies. These factors resulted in the discard of relatively large amounts of raw material. Thus, lithic raw material waste was acceptable during primary production if composite tools could be repaired and component supplies were replenished. Finished components were discarded in accordance to the availability of replacement components in portable supplies. Their technological attributes along with the limited amount of debitage associable to rejuvenation suggests that maximising the lithic raw material of prepared components was hardly a concern for the site occupants.

From this perspective we can see that people living at Île de France would prefer to maximise the durability of composite tools than the expenditure of lithic raw material. While tentative, the cache depositions at Feature 226 and 426 might further suggest an emphasis on the economisation of prepared lithic components. This form of caching has been integral to hunter-gatherers communities relying on mobile tool kits (e.g. Binford 1979; Bleed 1986; Hurst 2006; Kornfeld, et al. 1990). The cached objects either serve as seasonally ‘passive gear’ or insurance for future access to crucial raw material and equipment (Binford 1979:256). Caching is here considered

primarily as motivated by economic or adaptational efficiency, but the present case-study allows us to expand how we can understand the significance of such practices. As raw material preparation became territorialised to an ideal location for social gatherings, caching would allow people to indirectly convey their situated human-material relations to their kin or others that shared their lifeways. Future occupants would not only be provided extra components, they would also see how previous occupants had worked the material.

The contingent human-material relations inferred from the lithic assemblages emphatically indicate how the occupations of the island were part of movements qualitatively different than previously interpreted. Instead of a network of movements by regionally based people, the analyses suggest that these people lived in such ways where continued diversification of resources were desired. This allowed as well as motivated people to maintain a high degree of mobility that in turn counteracted the establishment of firmly regionalised networks of movement.

The location of Île de France presented people with an ideal focal point for accessing regional resources as well as for social interactions between different groups. People that had roamed different landscapes and ecologies would meet here to share both resources and experiences. The island thus became a crucial site for resource management and social enculturation. In turn, this contributed to reify cohesive traditional lifeways among multiple groups of people that would otherwise be separated through the year. This was not only the result of game availability or local weather- and sea-ice conditions, but by convergent processes at different scales (Flora, et al. 2018:18) where portable tool kits played an important part. From the present case-study, we can now factor in how human-material relations were involved in the emergence of dynamic history of human living at Île de France. Specifically, the demands of lithic raw materials that became involved in the curation of tool kits contributed to shape the history of Île de France as a crucial area for social interaction. These interactions helped people become quickly familiarised with raw material properties, promoting their ability for raw material diversification and in turn their capacity for high mobility into new landscapes.

5.6. Conclusion

This case-study has now indicated how relations between people and different lithic raw materials had important effects on Paleo-Inuit lifeways at Île de France and in northeastern Greenland during the Greenlandic Dorset. Through a Relational Approach it has been possible to identify how people

afforded to the demands of raw materials differently at different times through their circulation as part of portable tool kits.

During procurement, people would briefly assess which nodules were most appropriate to specific component types and their supplies. These events were contingent on the general quality of the available raw material as well as the available supplies of prepared lithic components. The case-study indicate that nodules were predominantly tested at dwelling sites rather than at procurement sites. Transporting nodules and preforms to dwelling areas would have ensured that knowledge, skills, and experiences could be attained by and shared between different groups gathered at the site. Furthermore, this helped ensure that raw material could be prudently assembled into tool kits during tool kit preparations. These events shaped brief warm-season gatherings that bolstered social relations between groups that were otherwise separated throughout much of the year.

Among the lithic raw materials brought to Île de France, quartz crystal would have been among the most demanding to craft components from, requiring frequent adjustments during production. The properties of the raw material therefore had considerable impact on how activities unfolded at Kap Skt. Jacques, further territorialising people's efforts into tool kit preparation. Conversely, the inferred human-material relations of other raw materials such as quartzite and MCQ indicate that these were deposited during events that primarily afforded pertained to the demands of composite tool maintenance. Thus, we can now recognise that the lithic deposition at Île de France were formed by events that were significantly structured by the various demands and temporalities of local and non-local lithic raw materials.

While Île de France would have been an attractive location for Paleo-Inuit groups during the Greenlandic Dorset by its regional position at the cusp between areas rich with resources, we can by a relational perspective recognise how contingencies co-created by materialities and the local environment impacted the unfolding of Greenlandic Dorset lifeways here. By highlighting the multiple assemblages of relations that lithics were involved with and the different temporalities these relations produced, it is evident that only quartz crystal was brought to the site immediately after procurement. Conversely, lithics of other raw material types had already been widely circulated—having previously been involved in numerous events ranging from procurement, preparation into components, and crafting of composite tools. Groups that had already been involved in long-distance movements prior to the brief site occupations at Île de France would

move on to continue their highly mobile lifeways—some moving northwards and others moving southwards. Although some groups would have returned to the island, it was not a permanent focal point in the region.

Chapter 6 - Re-assembling Greenlandic Dorset Lifeways

With a Relational Approach using concepts from Assemblage Theory, this thesis has critiqued the perspective of Greenlandic Dorset lifeways as defined by a highly conservative technological tradition. By revisiting numerous lithic collections to fundamentally re-examine these with this approach, I have subjected three contrasting regional case-studies to a fresh empirical investigation using new ideas drawn from relational thinking. As a direct result, new and more dynamic local and inter-regional perspectives have emerged where we can recognise how lithics acted back on the lifeways of people rather than being passive mediums upon which mental templates were imparted. Greenlandic Dorset lifeways were therefore defined by far more than the replicative stamp of conservative human behaviour. In fact, they emerged from dynamic, variable, and historically contingent relations – situating the unfolding interactions between knowledgeable people, lithics, composite tool kits, and other non-human beings around Greenland. These relations played out in different ways in different regional environments. In this final chapter I will bring the regional case-studies together, deploying the Relational Approach to re-assemble a new understanding of Greenlandic Dorset lifeways. We can here see that the relentless demands of lithic materialities took active part in constituting dynamic assemblages of relations that structured dynamic and regionally variable Greenlandic Dorset lifeways. It bases a new understanding that explains the formation of a brief period in Greenlandic prehistory. This takes us a long way from an interpretation of a standardised and conservative tradition to one that recognises the flexible, constantly recurring balancing and trade-offs of needs and affordances between multiple actors in contingent relations. As lithics afforded different availabilities and demands, they required people to engage in consistent diversification of lithic raw material use, lithic component crafting through highly flexible and skilled production, and prudent strategies for composite tool maintenance. Stone-using tool kits thereby structured pioneering lifeways that demanded continuous exploration of different Arctic regions. Following the discussion, this final chapter will subsequently look onward and outward to how the present approach can make important contribution to future archaeological research on human living in circumpolar prehistory.

The point of departure for this thesis has been the recent culture-historical definition of the Greenlandic Dorset as a distinct technological tradition that branched off into Greenland from the Canadian Early Dorset culture (cf. Grønnow and Sørensen 2006; Sørensen 2012). This definition was achieved by the construction of a standardised taxonomy of its lithic technology by using a *chaîne opératoire* methodology which is essentially underpinned by a Mind-on-Matter principle. However, the attempt to explain Greenlandic Dorset lifeways by this Mind-on-Matter approach inadvertently reproduced a problematic and reductive interpretation of Arctic communities during the Greenlandic Dorset as defined by highly conservative social behaviour.

The thesis began by reviewing the research history on the Early/Greenlandic Dorset in Chapter 1. This highlighted the problematic legacy in the theoretical discourse of eastern Arctic and Greenlandic archaeology that has been reproduced in the current understanding of Greenlandic Dorset lifeways. On the one hand the discourse succeeded in producing the methodologically rigorous and dynamic definition of the Greenlandic Dorset as a separate culture-historical continuation of the Early Dorset technological tradition, but on the other it failed to provide dynamic interpretations of its unique Paleo-Inuit lifeways. Most importantly, the framework produced a standardised taxonomy of the distinct Greenlandic Dorset lithic technological tradition. However, it relied on this as basis for interpreting Greenlandic Dorset lifeways. Hence, a modernist perspective was reproduced that reduces people at the time into static transmitters of a technological tradition while treating the lithic remains of their material technologies as its inert representations. This presupposes cultural continuity as largely dependent on the ability of people to consistently follow mental recipes of social behaviour, whereas the breaking of this cultural obligation could only have occurred due to external causes such as environmental change or via diffusion of knowledge from other cultures.

The first argument of the thesis was that a new theoretical framework was necessary for a deeper exploration of the active role of people as well as their tool technologies as the two shaping forces of this period of Greenlandic prehistory. This argument pivoted a crucial theoretical premise of relational thinking that has been applied in my thesis: People act on materials, but materials also act back on people. I thereby argued that to investigate this important dialectic between people and things could offer an alternative way to understand the Greenlandic Dorset phenomenon that would neither give priority to mind or to matter – but to the historically contingent interactions and relations between them. This provided the basis for a relational framework to the study of lithic

technology that can offer a better understanding of how Greenlandic Dorset lifeways played out in the vast landscapes of Greenland.

To test and replace the problematic interpretation of Greenlandic Dorset lifeways, a central aim of my thesis has been to establish and operationalise a Relational Approach. To fundamentally re-examine extant lithic assemblages, this approach upgrades the *chaîne opératoire* methodology with theoretical concepts from Assemblage Theory. Through the methods of technological classification, refitting, and Minimum Analytic Nodule Analysis, the Relational Approach has allowed me to investigate how lithic materialities added important structure to Greenlandic Dorset lifeways. While lithic materials are by far the most abundant remains from the period, previous approaches have remained exclusory to assemblages that do not meet criteria of representativity. The Relational Approach has allowed me to circumvent this modernist bias. This way, my study has extended the argument by Sørensen that we should acknowledge the diversity of lithic types in Paleo-Inuit technologies (2012:37-38), by simultaneously highlighting the importance of considering their roles as components in flexible and dynamic composite tool kits while including assemblages composed of artefacts that do not neatly fit into standardised typological and technological categories. Doing so, I have explored and demonstrated the deeper interpretative potential that extant lithic collections can offer.

In chapters 3, 4, and 5, the approach was employed in individual case-studies that targeted separate and uniquely different regions of Greenland: Qeqertarsuup Tunua, Peary Land and its adjacent areas, and Île de France. Combined, these three regions comprise most of the available lithic assemblages from the period. Individually, each case-study has been built on empirical analyses of lithic assemblages that were deposited in a distinct Arctic landscape and environment. Viewed through a relational perspective, the analyses have treated lithic materialities as active participants in shaping local Greenlandic Dorset lifeways by the effects of their material properties and their interactions in composite tool relations.

Overall, the case-studies have examined how lithics exerted demands on people during production and while being assembled into tool kits by (1) the physical properties of lithic raw materials, (2) raw material availability, and particularly important (3) the role played by specific composite tools in the broader tool kit. Each of these factors were always contingent, continuously situating when, where, and how people interacted with lithics. These interactions created important

ramifications for how people interacted socially between themselves, with their portable tool kits, and with their environments.

As active parts of tool kits that demanded constant curation, lithic materialities set important precedents for how highly mobile communities were able to and became situated in different landscapes of Greenland. This had significant impact on how Greenlandic Dorset lifeways emerged through the second colonisation of empty yet previously inhabited landscapes of Greenland. Specifically, tool kits and their composite tools entrenched people in human-material relations that demanded prudent and flexible tool kit curation. In turn, these relations compelled expansive pioneering movements and interspersed regional occupations. The demands of lithic materialities and their composite relations during production, use, and maintenance therefore added significant structure to these pioneering lifeways.

By synthesising the three case-studies, I will in this final chapter discuss and elaborate how the agency of lithic materialities and the tool kits in which they functioned were instrumental to the unique lifeways of the second pioneers of Greenland. This chapter represents the final step in disassembling the interpretation of Greenlandic Dorset lifeways as defined by a conservative technological tradition and draw insights from the case-studies to re-assemble an interpretation of these as structured by dynamic assemblages of relations between people, lithics, and portable composite tool kits.

Finally, I also want to reflect on the general efficacy of the Relational Approach and the extent to which it can contribute to enrich interpretations of Arctic lifeways in future research.

6.1. General discussion: Re-assembling tool kits to understand pioneering Arctic lifeways

Lifeways during the Greenlandic Dorset period were not solely defined by knowledge of the landscape nor ideologically derived behaviour, but also by the specialised tool kits that people at the time brought into, maintained, and reproduced in different regions. Tool kits supported people and their survival, but in doing so exerted contingent demands to which people had to continuously respond to situationally. This formed dynamic human-lithic relations that defined different regional histories. We can therefore regard the agency of tool kits and their assembled materialities as significant to how lifeways were structured and unfolded throughout the period.

Careful curation of organic components was heavily prioritised during the Greenlandic Dorset. To this end, lithic objects were vital as reserve components that allowed stone-using composite tools to be expediently maintained. Despite their flexible production from diverse raw materials, lithic components became territorialised by the affordances of composite tool curation. This afforded people a high degree of responsiveness to unfamiliar environments where access to organic raw material could be unpredictable, but also entrenched people into expansive mobility. This had an important impact on the reification of ephemeral relations with regional landscapes, which helped make the Greenlandic Dorset a highly expansive but brief period. Portable tool kits supported the survival of people and their communities in Greenland during this period, but in doing so they exerted profound demands that structured regionally different relational dynamics between people and materials around the island.

The first case-study set the sights on the Greenlandic Dorset lifeways of Qeqertarsuup Tunua in western Greenland. This region was chosen as the point of departure for my analyses as its selected lithic assemblages are among the most well-studied in the archaeology of the Greenlandic Dorset. These assemblages have been central to both the definition of the Greenlandic Dorset technological tradition and earlier interpretations of its lifeways. The case-study aimed at examining how lithics as active parts of portable tool kit technologies structured the temporalities of lithic production, setting important demands for when and where human-material interactions occurred.

In order to gain access to lithics that could be crafted into the variety of components necessary for their tools, groups of people would here have to move back and forth over considerable distances from the ecologically rich area in southern Qeqertarsuup Tunua to its northern area where lithic raw materials were available. These long-distance movements were made possible at the time by the prepared lithic supplies produced at cold season dwelling sites, which afforded swift tool maintenance during warm season dispersals. However, the prepared tools and lithic supplies would at the same time set important demands on lithic raw material choice, requiring people to expediently select lithic nodules of diverse raw material types that were similar in size and shape to specific component types. On the one hand, this added the benefits of lessening transportation haul and efforts into lithic production. On the other, it exacerbated the need for flexible and highly skilled knapping in response to diverse lithic raw material properties during subsequent tool kit preparations at cold season dwellings. Therefore, the contingent demands of

lithics had important effects on the formation of a relatively stable history of seasonally cyclical long-distance movements within Qeqertarsuup Tunua.

The second case-study turned the attention to Peary Land and adjacent areas in northernmost Greenland. The area holds a special position in the research history of Greenlandic archaeology, and its lithic assemblages have been crucial to the definition of the Greenlandic Dorset tradition and to describe its spread around Greenland. However, due to their general lack of representativity, only a select few of these have been included research following their excavation by Eigil Knuth. By revisiting most of the available assemblages from the area with a Relational Approach that offers a deeper interpretative potential despite representativity, the case-study aimed at explaining how lithics were involved in inter-regional dispersals that extended into northernmost Greenland. This demonstrated how people with highly prepared tool kits engaged with a vast High Arctic landscape that was ecologically patchy, but where lithic raw materials were abundant. This resulted in far-reaching movements of people where events of human-lithic interaction primarily afforded to tool maintenance.

These events formed sparse depositions that made it possible for me to highlight how the affordances of lithics during the regional period were contingent on how they were assembled into tool kits. Whereas tools integrating bifacially produced components could be quickly maintained through replacing broken components with prepared ones kept in supply, the maintenance of tools integrating microblades or adzes more often required lithic production. Prepared microblade cores absolved the need for primary production, instead enabling recurrently brief and structured production of component replacements. As adzes could be expediently made, the regional availability of lithic raw materials allowed people to procure and produce these at their convenience. As such, the case-study showcased how lithics would restrict and permit the strategic as well as opportunistic responsiveness of people, entrenching them into highly mobile movements and transient relations with the regional environment. This was crucial to the formation of a remarkably brief presence of people in the region.

The third case-study investigated lithic assemblages from the site of Kap Skt. Jacques on Île de France in northeastern Greenland. This site was chosen as a case-study for its remarkable scale, its importance to our understanding of the Greenlandic Dorset culture-history, and its highly unique composition of lithic raw materials. The case-study specifically focused on how the

properties of regionally and locally available lithic raw materials structured lithic production at the site.

Kap Skt. Jacques was visited on numerous occasions by groups that moved between the polynya area along the narrow coastline to its north and the more open landscapes to its south. Via embedded and expedient procurement, people acquired lithic nodules from several sources of different lithic raw materials throughout the region. Lithics of MCQ and quartzite were predominantly deposited from component replacements pertaining to tool maintenance. The deposition of these lithics were therefore largely contingent on their temporalities and properties as assembled into prepared tool kits.

Conversely, lithics of quartz crystal were predominantly deposited during events of primary production. This involved testing, preparation, and component production from nodules that had been locally procured in the area adjacent to Île de France. The deposition of quartz crystal was therefore highly contingent on the local availability of the raw material and its properties which exerted harsh demands on the skills of knappers. This resulted in the dominance of quartz crystal among lithic assemblages from Kap Skt. Jacques. In turn, this opened interpretations of the important effects lithics of quartz crystal had on social interaction between people at the site. Having been brought to a dwelling area that aggregated multiple groups, the recently procured lithic nodules formed important events where skills and knowledge could be developed and passed on between interacting people that were otherwise separated during dispersals – familiarising them to the availability and properties of the local raw material. As such, the case-study explained how lithics structured the formation of Kap Skt. Jacques into a central gathering site for small and dispersed groups of people living northeastern Greenland during the Greenlandic Dorset period.

Having defined and explored research questions specific to three different regions of Greenland, it is time to return to and confront the main research question of the thesis:

- What role did human-lithic relations play in the creation and structuring of Greenlandic Dorset lifeways in three different regions of Greenland?

To resolve this question, the following discussion is structured around a series of secondary questions that draws insights from the three case-studies to re-assemble a novel understanding of Greenlandic Dorset lifeways.

1. Does the standardised taxonomy of Greenlandic Dorset lithic technology (Sørensen 2012) adequately reflect the true and contingent variability of tool kit production, use, and maintenance? Partly. By emphasising the fact that most lithic objects at the time were integrated into composite tools it has been possible to infer a broader diversity of lithic components than accounted for in Sørensen's techno-typological taxonomy. This was made possible by assessing proximal haft designs and the morpho-technological characteristics of the distal area—in a similar vein to how different sub-types of Saqqaq lithic components have recently been identified by Grønnow (2017). In my case-studies, the designs of bifacial components such as endblades, scrapers, and burin-like tools did not notably cluster within groups that would allow distinction of type classes (see part 3.5.). We here see that individual components were deposited following a variety of material histories. Their functional roles presented different contingencies that would influence when and where depositions occurred.

In the case of bifacial endblade components, the variety of designs observed in my study suggests that these were primarily used as knife armatures, but we still cannot rule out that some of the examined objects may have been weapon armatures (Figure 16). Regardless, an endblade fitted into a composite knife was likely expediently used for a range of different purposes that had varying effects on when and where such components were deposited. Until we can assign specific endblade designs to specific tasks, we must assume that this contributed to the irregular frequencies of endblades among Greenlandic Dorset lithic assemblages.

From assemblages of burin-like tools and scrapers we can infer more specialised roles for components of different sizes and designs. As components in tools for producing and maintaining organic tool components and other items, burin-like tools were vital for people to produce and maintain tools and other organic items during the Greenlandic Dorset. This made it necessary to incorporate burin-like tools of various sizes to accommodate different stages in their use for shaping a variety of organic objects with different properties.

Juxtaposing the empirical analyses of burin-like tool assemblages with the linear template of burin-like tool production sequences made by Sørensen (2012:197-198) we can see that size variations were not outcomes of different stages of production. The occurrence of finished burin-like tools in a variety of sizes suggests that their production and maintenance were accommodated for different tasks similar in execution. This provides an alternative interpretation of the tentative differences in burin-like tool designs noted by Sørensen. My analyses were not able to substantiate

his sub-division of such components into a ‘narrow’ and ‘broad’ type. Instead, it has been indicated that these were variations on a spectrum of designs that were contingent on both function as well as the overall composite tool design.

Examined endscraper components in each of the three case-studies also indicated that people produced and maintained several endscraper tools for different stages of processing organic material. Analogy to ethnographic accounts suggests that people during the Greenlandic Dorset would have to incorporate endscrapers of different sizes and designs during skin-processing (part 3.5). Their use, particularly the smaller components, also involved shaping harder organic materials (Maxwell 1985:177). A formal analogy to the Saqqaq period should also be considered, where tool kits contained a diverse repertoire of endscrapers for various stages in the production of vessels made from driftwood and soapstone (Grønnow 2017:401). Knowing that people relied on soapstone vessels during the Greenlandic Dorset period (Jensen 2006b:146), it is conceivable that people would have to assemble their scraper tool kits similarly.

Sidescraper components during the Greenlandic Dorset were likely involved in activities related to shaping of hard organic materials (Maxwell 1985:177) These materials likely varied in size, making it necessary for people to produce sidescrapers that were adapted accordingly. Its ‘ideal’ type was only identified in assemblages from Qeqertarsuup Tunua and Île de France, and

Figure 16: Principle hafting methods used during the Greenlandic Dorset as suggested by Sørensen (2012:223)

generally small quantities. The rare deposition of sidescrapers suggests that their use was infrequent and highly specific. However, as with endscrapers, tool kits would likely have to incorporate a repertoire of such tools.

2. Does each lithic type reflect the need to perform individual kinds of tasks? No. With a reconfigured concept of typologies as relational (see part 2.1.2), the categorical divide between specific component types was demonstrated as more porous than previously assumed. The distinction between sidescrapers and endscrapers most clearly indicate this. By indicating the existence of ‘hybrid’ scrapers during the period, my case-studies suggest that lithic component designs did not always pertain to specific functions and tasks during the Greenlandic Dorset, but rather emerged circumstantially.

This insight was generated during the examination of lithic assemblages from northernmost Greenland (see part 4.5.), which included endscrapers featuring a distinctly asymmetrical design that included a carefully shaped lateral curve at its distal area. This design characteristic, generally associated with the typologically distinct flared edges of endscrapers, has not been previously discussed. It has instead been assumed as part of their hafting design (Sørensen 2012:223-224, Figure 16). The smooth curve observed among several ‘hybrid’ endscrapers suggests that these were exhausted after continuous rounding of smaller organic objects. My discussion of this feature prompted the hypothesis that this design was made for the components to function as either endscrapers or sidescrapers. Similarly designed objects were also recognised in assemblages from both Qeqertarsuup Tunua and Île de France but were far less frequent. Thus, the design likely emerged situationally during tool kit preparations where it was desirable to prudently limit the carried load of component supplies. This might then explain the dominance of such components in assemblages formed during the pioneering movements of people through the harsh environment of northernmost Greenland.

3. Would certain composite tool designs exert demands and need for standardised components more than others? Yes. A notable example is the sideblade component. Despite being produced by similar methods and technique to endblades, the design of sideblades are far more homogenous. This can be explained both by their use and their composite tool relations.

Among bifacially produced components from the period, sideblades stands as the most definite hunting tool components. Their design demanded a single purpose: Effective hunting of game animals. The design and use of cloven-hoof lances greatly territorialised the design of sideblades. The initial crafting of a cloven-hoof lances therefore had significant impact on future choices during production of replacement components, while the desired function of the composite—actualised during hunting activities outside of dwelling areas—would have resulted in fragmented components becoming distributed across the open landscape.

The relatively few depositions of sideblades at dwelling sites was likely caused by removing components stuck in carcasses brought to the dwelling or during events of on-site retooling or depositions of cloven-hooved lances.

As a point of comparison, microblades appears to have been tied to activities more specific to dwelling areas. The relative abundance of microblades in lithic assemblages indicates that these were most prominently produced for and utilised in ‘household’ tools at the time.

Across the world there are numerous examples of prehistoric periods where microblades played a primary role in stone-using tool kits (e.g. Damlien 2014; Goebel, et al. 2000; Rankama and Kankaanpää 2011; Tabarev 2012; Yi, et al. 2013). Their use throughout the eastern Arctic prehistory were more complementary, being part of a much broader repertoire of stone-using composite tools

Figure 17: Conceptual drawing of how microblade composite tools may have been designed during the Greenlandic Dorset. The drawing is inspired by Late Dorset findings from Baffin Island (Mary-Rousselière 2002:145).

(e.g. Desrosiers 2009a; Desrosiers and Sørensen 2016; Desrosiers and Sørensen 2012; Grønnow 2017; Maxwell 1985; Nagy 2000). Microblade knives provided people with hand tools effective for finer cutting and shaving of organic materials (Grønnow 2017:400-401; Sørensen 2012:209). However, it can be assumed that microblade knives were multi-purpose tools. Besides household tasks involving crafting, they would also be used initial processing game animals after a hunt. Microblade knives would likely have been used interchangeably with larger bifacial endblades when careful processing of game was necessary, allowing butchering of difficult joint areas of larger animals or careful of sinews (Maxwell 1985:142-143).

4. Beyond their functional roles, what other relational factors can explain why microblades are among the most frequently deposited components at Greenlandic Dorset sites? My Relational Approach has demonstrated that microblades were most often deposited following retooling composite microblade knives, occasionally involving brief sequences of production. The curation of microblade knives was significantly influenced by highly standardised production, but during the Greenlandic Dorset period these production sequences were often greatly partitioned both temporally and spatially across the landscape – strongly indicating a pragmatic relationship between production stages and places in the landscape. This emerged from strategies of tool curation where curation of microblade cores was prioritised over individual components. Reserve microblade components would effectively be ‘stored’ in highly prepared cores. As the production of microblades would require highly developed knapping skills, it is conceivable that these were meaningful events where both lithics and people instigated gatekeeping of participation among individuals in the community.

On a practical level, the transporting prepared microblade cores allowed less time and effort to be spent into the maintenance of microblade knives (e.g. Bleed 2002; Goebel 2002; Sano 2010; Yi, et al. 2013). With only a few removals, a broken component could be replaced, while additional components of similar size and shape were transported in reserve. Keeping a small reserve of finished microblades likely complemented this strategy of tool curation to further mitigate the need for production, but at a higher risk of reserve components being damaged during transportation. An extensive lifecycle for both microblade cores and composite microblade knives were thus ensured, while simultaneously resulting in far more frequent depositions of redundant microblades.

5. Were lithic components produced and deposited as part of linear and highly localised sequences of production, maintenance, and tool use? No. Lithic production was deeply

embedded in strategies of tool kit curation that unfolded over time and space that far surpassed individual site occupations. Such events were rather highly contingent on the

As people would rely on the use of their tool kits wherever they went and throughout the seasons and years, tool maintenance would have been a consistently recurring requirement that could arise at any time and place. Rather than via production of new components, the preferred way of tool maintenance during dispersals was the replacement of broken components by prepared components kept in supply. This responsiveness was contingent on preceding events of tool kit preparation that supplied spare components and highly prepared microblade cores. Recursively, tool kit preparations were contingent on the available tool kit supplies following seasonal dispersals. During such events, people would have to respond to the properties of diverse raw materials procured across the landscape and the availability of previously prepared supplies.

Even though the highly standardised methods involved in the production of microblades greatly homogenised their design, their deposition does not suggest behaviour where protracted sequences of production were desirable. Rather, people tinkered with their tool kits whenever it was required, replacing redundant components when necessary, or producing a few components to maintain supplies that allowed swift component replacements. Depositions were consequently formed by non-linear histories of production and maintenance. This was most evident among bifacially produced components, particularly endblades. While their depositions occurred at most stages of production and composite tool maintenance, only a few components suggested protracted component maintenance by rejuvenation (see part 3.5.). For bifacial components, standardised sequences of lithic production were not prioritised. Instead, design standardisation occurred in response to the properties of composite materials and diverse tool purposes, as explained earlier.

Unfortunately, organic materials are mostly absent in the archaeological record from the Greenlandic Dorset period. However, my study suggests that people at the time expediently utilised a variety of organic materials for making hafting components. Viable materials may have included driftwood, antlers, ivory, and bone (Maxwell 1985:149). This means that deposited lithic components were only a small fraction of existing tool kits, and complete sequences of production and use of any component type have not been observed in my study. Discarded components were commonly replaced by prepared reserves in stock. This would occur even when it was technically possible to prolong the use of components by rejuvenation. Transporting a supply of preforms and

reserve components was therefore an essential strategy during the period, and different component types defined it differently.

Lithic components were far more expendable than organic components. People therefore made several easily replaceable components for individual tools. This alleviated the need to frequently produce new lithic components. For example, in circumstances where there was a surplus of replaceable components, redundant objects would be replaced without concurrent knapping. If the supply of replaceable components ran low, keeping an additional supply of highly prepared preforms allowed people to produce new components regardless of raw material availability in the area (see part 3.5).

6. Did composite tool relations directly structure which knapping technique could be used? Yes. The case-studies have demonstrated that the use of different knapping techniques during lithic production and rejuvenation complied not only to the properties of lithics, but also to the properties of composite tool designs. We can first consider the use of pressure-flaking. Pressure-flaking was a crucial technique to produce microblades as well as bifacial component. This is also evident by the remains of organic pressure points from the Early/Greenlandic Dorset period (e.g. Grønnow and Jensen 2003:147; Maxwell 1985:151; Schledermann 1990:327; Sørensen 2012:216). Mastering its use was among the primary skills required to detach flakes and microblades during the earliest Dorset periods across the Eastern Arctic (Desrosiers and Sørensen 2012:382; Sørensen 2012:223). Without it, tool kit maintenance and production would have been severely limited. With this in mind, we can begin to recognise that the prevalence of pressure-flaking during the Greenlandic Dorset did not emerge entirely from traditional preference, but also by the constant demands afforded by tool kit materialities.

For example, the preference for pressure-flaking defined and was defined by procured lithic raw materials. During lithic procurement and primary production, choices were frequently made in affordance to the size and shape of specific component types, which in turn afforded to composite tool designs. This required people to employ pressure-flaking during most stages of component production. The material properties and material-material relations constituted by tool kits were thus pivotal to reifying the prevalent use of pressure-technique through the Greenlandic Dorset. This way, the use of the technique was not entirely a matter of choice but territorialised by assemblages of relations reified by tool kits.

The production and maintenance of lithic components during the Greenlandic Dorset period was not limited to pressure-flaking. Besides burin-like tools, the presence of ground killiaq endblade objects in assemblages from Qeqertarsuup Tunua is evidence that people would occasionally produce endblade components by use of polishing. Although early stages of ground endblade production likely involved bifacial knapping as preparation, a ground finish is only seen among specimens of *killiaq* in this region. A single finished endblade of slate-like raw material was collected from Kap Skt. Jacques, providing some evidence that the raw material type did not necessarily demand the use of polishing.

Combined, pressure-flaking and polishing were essential techniques that allowed people to expediently make lithic components from diverse types of raw materials. This enabled people to flexibly maintain their transportable tool kits in response to the many contingencies of tool use, as well as to varied availability and quality of raw materials. This in turn promoted the diversified use of lithic raw material that characterise the Greenlandic Dorset as well as the Early Dorset period across the eastern Arctic (e.g. Desrosiers 2009b; Maxwell 1985; Nagy 2000).

7. Was lithic production and tool kit maintenance affected differently by different raw material properties? Yes. For mobile ways of Arctic living in familiar and unfamiliar landscapes alike, anticipating when and why tool production and maintenance was required would have been essential. From a phenomenological perspective, the properties of a tool and its components were ‘withdrawn in use’, demanding attention only when they performed poorly or broke (cf. Heidegger 1962; as cited in Schubert and Röhl 2019:172). The inconvenient moment a preform or tool broke during production and use thus revealed the properties of different materials and designs. This not only made people begrudgingly experience the quality of its materials but also cultivated their ability to produce or maintain their tools. During subsequent events of tool maintenance and tool kit preparation such experiences would shape how people strategized the curation of their tool kits further on.

Constant familiarisation with diverse lithic raw materials would have crucial to these highly mobile people. Moving through landscapes where raw material access was often precarious and of varied quality, even skilled and experienced individuals could be uncertain of the quality of raw materials in production, maintenance and use of stone-using tools. Thus, the fragmentation and deposition of cores, preforms, or finished lithic objects can only partially be explained by level of skill.

A diversified use of raw materials meant that people would have to curate components of varied quality and affordances. People would necessarily adjust production and maintenance accordingly. Assemblages of objects related to microblade production and maintenance most clearly illustrates this. Both in assemblages from Qeqertarsuup Tunua and Île de France, we have seen that the use quartz crystal as microblades created different spatiotemporal patterns of deposition than of MCQ.

While the physical characteristics of examined quartz preforms were observed as more heterogenous than MCQ, successfully produced microblades yielded sharp and durable components that presumably lasted longer during use than more fragile microblades of MCQ. Its use came at a higher cost and effort spent in core production and rejuvenation but yielded high quality components. Therefore, the material properties of both microblade cores and microblades of quartz crystal would have different effects on the pacing of tool kit maintenance and production than the properties of MCQ (see part 5.5.). The use of MCQ conversely allowed for more prolonged curation of microblade cores, but at a higher expenditure of individual components.

It has been observed that the largest quantities of burin-like tools correlate with the use of *killiaq*, whereas regions where burin-like tools are exclusively made of MCQ feature limited numbers of specimens. This relative difference can be partly explained by the briefer occupation of northernmost and northeastern Greenland than in western Greenland. As the lithic assemblages from Qeqertarsuup Tunua suggests, the site occupations here involved a broader diversity of site activity where the use of burin-like tools were more prevalent, while the briefer occupations inferred from the other two regions did not require a similar intensity of use for the specific tool type. Regardless, my analyses have indicated that their deposition were also affected by raw material properties. With *killiaq* being a comparably softer material than MCQ, objects made from the raw material would likely be worn out more frequently. Considering the morphology and probable use of burin-like tools, components made from MCQ were more durable and deposited less frequently during use.

Adzes are exceptions to microblades and bifacial components, both in terms of raw material use and techniques involved in production. While the production and maintenance of microblades was significantly territorialised by methods of production, depositions of adzes during the Greenlandic Dorset indicate far more expedient production and use. Overall, their technological attributes and depositions suggests that the lifecycles of adzes were generally short and less

regulated (see part 4.5.). Adzes were far more expendable than other tool types. This is reflected in the prominent use of lithic raw material of lower quality but higher availability such as dolerite and *killiaq*. For such raw materials, the use of hard-hammer technique was enough to achieve a desirable form and design.

The absence of adzes deposited at Île de France was considered a possible consequence of a biased association between the tool type and raw material types, as adzes are typically associated with either *killiaq* or dolerite (see part 5.5.). A few large nodules of quartzite with limited traces of knapping removals were suggested as possible adzes. A single large preform of MCQ from Hvalterraserne in northernmost Greenland was also suggested to have been made as an adze. Although inferred from tentative and anecdotal evidence, I consider it likely that people at times did make use of harder stone materials for producing adzes when such raw material was in abundance.

The substantial expediency of their procurement, production and curation does not imply that adzes were insignificant tools at the time. However, we know little yet of what specific tasks adzes were used for during the period. It is possible that such tools were used similarly to adzes during the Saqqaq period; as important tools for material processing and crafting during the initial stages of preform carving of both soapstone vessels and a variety of organic objects (Grønnow 2017:398-399).

As the largest among lithic component types, people likely transported only a modicum of finished adzes. This allowed people to move with less haulage, as adzes could be procured, produced, and utilised at people's convenience. In circumstances where raw material was abundant yet more localised, as in Qeqertarsuup Tunua, people would transport larger hauls of raw material across longer distances and longer periods of time.

The production and maintenance of adzes also required less skill. The adzes examined in my study have indicated that only a few flake removals were necessary if the natural shape of a nodule was appropriate for use. It is therefore conceivable that novice members of the group were involved in the production and maintenance of these tools. Doing so allowed them to practice basic knapping skills as well as to gain insight into when tool kit maintenance was appropriate.

8. Did prepared tool kits play a didactic role in the acquisition of skills and knowledge for younger members of the community? Yes. The properties of lithics as component parts of composite tools could only be experienced during events where these were items involved in lithic

component production as well as tool use and maintenance. As their contingent demands were consequential to the continuous curation of tool kits, lithics created multiple temporalities that influenced when, why, and where such events occurred. These events presented members of the community with both novel and familiar experiences of how lithics of various raw materials acted in assemblages of relations involving composite tools, people, and the environment. As such, lithics were consequential to how knowledge and skills were developed and passed on between people during the Greenlandic Dorset.

The relative absence of obvious error-making among objects from sites across Greenland suggests that production and maintenance of lithic component tools were primarily performed by experienced and highly skilled knappers. For adolescent members of the community, skilled use of these tools was among the first thresholds towards becoming skilled knappers. This was part of oblique and gradual processes of learning (see Jordan 2015; Lew-Levy, et al. 2017). At first a person would have to learn the use of different tools for various tasks in daily life. Meanwhile, the person experienced how the ‘assemblages’ of composite tools behaved during use, fostering an understanding of how different materials acted upon each other. These would be the first steps towards understanding *when* and *why* composite tool maintenance was necessary, and to strategize tool kit curation accordingly.

Corollary to this process of learning would be to experience the properties of specific lithic component designs and materials. Although some steps and techniques in lithic production may have been taught from an early age, being able to adequately anticipate and respond to material properties and knowing how to strategize tool kit curation was highly directive to when an individual was permitted to participate in lithic production. The affordances of tool kits thus oriented social learning around an emphasis on highly flexible use of diverse resources.

When new lithic raw material was procured, people would have to respond to their different properties appropriately during production and tool curation. As was indicated by the case-studies, these interactions primarily occurred at dwelling areas where multiple members of the community would likely have been gathered (see part 4.4.5. and 5.5.). This way, inexperienced members of the group would be taught how to flexibly respond to different raw materials, ensuring the development of skills required by their tool technologies. This did not only entail skills in lithic knapping, but also skills and knowledge pertaining to the prospecting and procurement of lithic raw materials (Milne 2012:123).

Swift familiarisation of raw material availability in different landscapes would have been crucially important for highly mobile communities during the Greenlandic Dorset. The human-lithic interactions observed in assemblages from northernmost Greenland indicated that people were able to quickly recognise the regional abundance of raw materials in the region. Thus, they could afford to be particular in the choice of which nodules they would take with them (see part 3.5). A reverse situation was indicated in Qeqertarsuup Tunua, where lithics were available only in specific areas of the region (see part 4.5.). In these circumstances, people would have to act with more economic consideration during procurement and component crafting. Frugally only when necessary, people made expedient use of most nodules that were suitable for producing new components required by their composite tools.

This interpretation might explain the scarcity of primary production at Greenlandic Dorset sites. Whereas people during the Pre-Dorset period of Greenland and Canada tenured primary stages of lithic production to regional sources of raw material (e.g. Jensen and Petersen 1998; Milne 2012), early stages of lithic production during the Greenlandic Dorset were profoundly ingrained in the curation of tool kits. This is further suggested by the absence of Greenlandic Dorset quarrying sites in the archaeological record, although this might well reflect a lack of targeted surveying and fieldwork efforts (see part 3.1.).

Learning to become a skilled knapper during the Greenlandic Dorset period would not require novices to gradually learn linear sequences of production for specific lithic component types. Rather, ways of lithic production were taught that emphasised a high degree of responsiveness to the diverse properties and availability of lithics. While novices learned how to use and maintain different stone-using composite tools, they would gradually become skilled in a variety of sequences in lithic production and rejuvenation. As skill and confidence progressed, they would become better able to flexibly execute lithic production in accordance to different material properties, tool technologies, and environments.

9. Did tool kits structure practices of lithic procurement? Yes. The capacity for highly responsive and prudent tool kit curation outweighed that of committed use of specific raw materials. As a result, the durability of lithic components already fitted into composite tools as well as components kept in reserve would have a major impact on when procurement was necessary.

People during the Greenlandic Dorset did not commit themselves to specific raw materials nor their sources and would have to continuously assess the availability of lithics in any given area.

Meanwhile, their tools would compose a variety of lithic raw materials. Consequently, people had to continuously respond to different demands set by varying geologies as well as lithic raw material properties.

The practice of lithic raw material procurement during the period has been defined by Sørensen as a form of ‘embedded procurement’ (Sørensen 2012:311). People secured access to lithic raw material by maintaining a diversity of activities across the broader landscape. Sørensen further states that raw materials were primarily transported as finished tools (2012:315). While his interpretation pertains to templated lithic production, we can now see that lithics as part of composite tool technologies had significant effects on the reification of such a procurement strategy during the Greenlandic Dorset.

The evident reliance on diverse lithic raw materials suggests that procurement was highly pragmatic and thus hardly ever scheduled. As different component designs and raw materials presented varied affordances, the pacing of raw material procurement was significantly influenced by these. This had rippling effects on how people lived, as was argued earlier. We can thus recognise that tool kits propagated procurement opportunism during the Greenlandic Dorset. This opportunism was not defined by idealised understanding of how to procure lithic raw material: It was recursive to and reified by flexible responsiveness and strategies for maintenance of (culture-)historically unique tool kits. In other words, people did not procure raw material compulsively in deference to traditional knowledge, but more so in response to the affordances of portable tool kits. This demanded risk management strategies that counteracted commitments to the landscape, perpetuating lifeways where people relied more on the ability to acquire raw material in unfamiliar landscapes rather than becoming committed to specific sources in regional landscapes.

In this regard, it is worth mentioning that no indicators suggestive of people procuring lithic material from Saqqaq sites were observed in the present study. From a purely economic perspective, it is interesting that people during the Greenlandic Dorset apparently did not make use of the raw material that these depositions could offer—especially in areas of northernmost Greenland where discarded lithics would be scattered across Saqqaq dwelling areas. It is hard to imagine that these depositions would go unnoticed, which raises the question on how people during the Greenlandic Dorset perceived and related to the traces of people that lived in Greenland before them.

Continuously experiencing and expanding the understanding of the diversity of the geological landscape was immensely important to sustain tool kits—and thus lifeways—during the Greenlandic Dorset. Critical stages in learning how to knap did not become committed to specific sources of raw material. Instead, an ability to flexibly adjust lithic production and tool kit maintenance to similar yet different lithic raw materials was taught. The responsiveness of people during the Greenlandic Dorset thereby relied heavily on the accumulated knowledge and skill of groups that included members with different experiences of various landscapes, materials, and other non-human beings.

Despite living and moving through different landscapes, separate groups during the Greenlandic Dorset would all shared the practice of making structures for creating heat. These structures included simple rounded hearths and more elaborately built mid-passage hearths. We know from previous studies of Greenlandic Dorset lithic assemblages people were able to adjust the fracturing properties of lithic raw materials by heat-treatment (Sørensen 2012:189). Heat-treatment in lithic production is by no means unique to the period, and is seen throughout both eastern Arctic (e.g. Desrosiers and Sørensen 2016; Desrosiers and Sørensen 2012; Sørensen 2012) and global prehistory (e.g. Delage and Sunseri 2004; Inizan and Tixier 2001; Schmidt 2014).

10. Was heat-treatment deployed consistently in lithic component production and maintenance? No. Heat-treatment was used tactically under specific circumstances. Contrary to the interpretation by Sørensen (2012:310), my study suggests that heat-treatment was not pervasively used throughout every region of Greenland during the period. Among the examined lithic assemblages, it is primarily those from Qeqertarsuup Tunua that indicate its use, with an addition of a few lithic objects from Île de France. The use of heat-treatment during the period was therefore a particular strategy, contingent on the physical properties of regionally available raw material. This has implications for how people at the time understood and responded to the properties of lithic raw materials and responded accordingly, intertwining pyro-technological knowledge with the maintenance of tool kits.

The importance of pyro-technology in Arctic societies (see Appelt, et al. 2017; Odgaard 1998) makes it conceivable that conducting heat treatment of lithic materials was reserved to certain individuals in the group. This had territorialising effects on where lithic production occurred, but to the benefit of easing component production and rejuvenation. The production

technique committed knapping procedures to dwelling areas where the ‘infrastructure’ for the technique was available, i.e. mid-passage structures.

Therefore, heat treatment can be regarded as a contributing factor to the formation of larger lithic depositions in Qeqertarsuup Tunua (see part 3.5.). Examining when and where the technique was used can help us nuance not only the materialities and skills involved in tool kit maintenance, but also the depositional histories of lithic assemblages. My study therefore suggests that larger depositions of lithic objects formed during the Greenlandic Dorset period cannot be considered binary to the duration of site occupation. Another practice that could contribute to site depositions of lithic objects during the period was caching.

11. To what extent was caching an essential part of tool kit curation strategies? Highly limited. As sites from northernmost and northeastern Greenland suggests, people during the Greenlandic Dorset might on occasions have built caches to deposit tool kit materials. Although available interpretations of caches are highly arbitrary, two kinds of tentatively defined caches are included in the present study: Deposits of broken, fragmented tools, and deposits of useable cores and finished components. Arguably, only the latter can be caches that were part of tool kit strategies.

Available caches indicate that potential caching practices at the time involved storing finished tools or highly prepared preforms, i.e. microblade cores. These depositions reflect the inferred strategies of portable tool kit supply during the period, defined by tool and raw material management emphasising curation of finished components and tools. Epistemologically, this might possibly explain why so few tool caches from the Greenlandic Dorset period are known. Numerous lithic assemblages included lithic objects that could have been re-incorporated into tool kits with minor modification.

The inferred events of tool caching align with Binford’s definition of ‘insurance gear’ caching. As opposed to caching of ‘seasonal gear’, these were not made in anticipation of specific seasonal needs but instead to what might be needed at a given location at any point of time in the future (Binford 1979:257).

While we cannot yet assign the specific functions for each component type in available Greenlandic Dorset caches, I suggest that the inferred form of caching primarily served as extensions of tool kit curation strategies. As these strategies did not commit people to specific areas it is conceivable that caches were made to service the broader community rather than to the needs

of an individual group (Binford 1979:266-267). During the Greenlandic Dorset, these needs first and foremost afforded to tool kit maintenance. For another group to make use of such caches, it was prerequisite to share similarly assembled tool kits. On the other hand, familiarity with the specific raw material of cached lithic objects was *not* required, considering the diversified use of raw materials at the time.

Cached objects may have served as ‘blueprints’ for learning which raw materials were available in the area, its properties, and the methods and techniques that could be used to make these into tool components. In addition to resupplying the tool kits of future site occupants, the cached objects had a potential to simultaneously reaffirm their ways of living and help them become familiar to material resources in the region. Making use of a cache with familiar objects may have contributed to a sense of shared identity between different regions across time (see Knutsson 2006:169-170, 184; Milne 2012:139)

6.1.1. *How the curation of composite tool kits structured pioneering Greenlandic Dorset lifeways*

Each type of raw material, individual components, and composite relations contributed to creating unique lifeways during the Greenlandic Dorset. From these materially assembled relations emerged perhaps the most important constants in Greenlandic Dorset living: Portable tool kits. To be maintained, these tool kits demanded incremental and relentless re-assembling over time through crafting, use, repair, and curation. From the constant assembling/re-assembling of tool kits recursive dynamics emerged that enabled yet required people to maintain highly mobile movements across landscapes with different resource availability. The properties and deterioration of tool kits afforded their own maintenance in ways that propagated lifeways heavily reliant on emphatic *composite tool* curation. Great prudence was afforded in curating organic components, as their availability and durability would be far more precarious than lithic raw materials. Having now drawn on and discussed insights from three regional case-studies, we can now extrapolate the deeper significance of contingent relations between people, lithics, and composite tools. These broadly structured Greenlandic Dorset lifeways in three characteristic ways:

1. **Nurturing keen skills in lithic raw material prospecting and flexible procurement in response to existing tool kits.**

- As raw material procurement was embedded in other activities in the landscape, the ability to identify lithic raw material on the move was essential, more so by the fact that people did not commit to specific sources. People would have to attain a keen eye for lithics in the landscape while being skilled and creative enough to incorporate these into existing tools. This ability was crucial to the curation of portable tool kits in the diverse landscapes of Greenland, and thus the ability to recognise diverse lithic raw materials and their potential was highly desirable. Caching of lithic components may have further aided people in learning about the regional availability of raw materials and how to make these into tool components.

2. Carrying small and portable reserves of lithic components.

- People would produce several components of similar design intended for individual tools. To ensure the curation of specific organic hafts, lithic components would have to be designed according to their relational properties. This created what I call a *responsive standardisation*, whereby composite tool relations situated and homogenised the production of lithic components. In turn, this would distribute depositions of specifically designed components over considerable space and time through replacements by similarly designed spare components kept in portable supply. Thus, homogenisation and standardisation of lithic components primarily emerged from the demands afforded by the multiple parts of composite tools, and not from standardised recipes of lithic production.

3. Highly pragmatic production of lithic components in service to careful tool kit curation.

- People during the Greenlandic Dorset likely made and curated organic tool components from a variety of raw materials, and for similar yet different tasks. This had cascading effects on the responsive standardisation of lithic components, presenting people with different relational properties that

demanded varying responses. If the properties of a lithic nodule were adequate to the composite tool and its desired function, it would be made use of.

- Sequences of production always had to accommodate the properties of different lithic raw materials. The goal of keeping a supply of replaceable components made pragmatism desirable in raw material choice and production, which hinged on highly skilful and flexible knapping abilities. This involved not only varied sequencing of knapping procedures, but also the use of heat-treatment. The negotiation between modalities of lithic production and diverse raw materials contributed to qualitatively and quantitatively varied regional histories of daily living.
- Attaining skills and knowledge of knapping was a non-linear process that emphasised gradual involvement into all aspects of tool kit use and maintenance. Linear learning of lithic production would have been incompatible to the curation of tool kits in pioneering lifeways that ranged between multiple different landscapes.

These highly generalised principles explain how regionally and historically distinct lifeways emerged during the Greenlandic Dorset. People lived as ‘strangers in familiar lands’: *Familiarity* to diverse landscapes was desired in favour of *commitments* to specific ones. Lithic materialities and their contingent relations to composite tools perpetuated these dynamic lifeways through situating and patterning highly transient relations between people and regional landscapes. Within a brief span of time in the scale of eastern Arctic prehistory, this greatly contributed to the introduction, perpetuation, and eventual disappearance of a distinct technological tradition across multiple regions of Greenland.

6.1.2. *Integrating the materiality of tool kit assemblages back into the prehistory of the eastern Arctic*

Deposits of lithic materials can represent much more than culture-historically defined social traditions that determined how and where practices took place. We can now add in lithic component materialities and associated tool kits as active participants of lifeways during the Greenlandic Dorset and eastern Arctic prehistory. Lithic materialities contributed to the emergence of the

Greenlandic Dorset period as historically *involved* with human and non-human actors rather than being products of technological tradition. My study has therefore elucidated the important role lithic materialities played in shaping the lifeways by which the second colonisation of Greenland was achieved and maintained over a few generations.

The influence and affordances of tool kits reified human-material relations that embedded practices into tool kit curation. Tool kits during the Greenlandic Dorset created practices that emphasised prudent tool kit curation over highly structured lithic production. Drawing a comparison to the lithic tradition of the preceding Saqqaq/Independence I period helps illustrate this.

An important difference is how people committed themselves to specific sources of lithic raw materials. The practice of direct lithic procurement helped create more regionally sustained lifeways as people were committed to specific sources to resupply tool kits with lithic components. A complementary practice was the transportation of larger preforms to supply tool kits. These preforms were exchanged between people, providing peripheral groups their supply of lithic raw material as well as creating and maintaining regionally based social networks (Grønnow 2017:362; Sørensen 2012:313-314).

Projecting my conceptualisation of how dialectic and contingent relations between people and tool kit materialities defined Arctic lifeways during the Greenlandic Dorset, we can hypothesize how tool kits influenced the tenured procurement of distinct raw materials (i.e. *killiaq* in Qeqertarsuup Tunua) during the Saqqaq/Independence I period by emphasising frugal lithic production. Maintenance of stone-using tools was pivoted on the transportation of preforms, and a lack of these put more severe constraints on people than it would during the Greenlandic Dorset. Making the most out of preforms was of key importance, and so would the Saqqaq tradition of lithic production and design become rigorous and consistent (Grønnow 2017:400; Sørensen 2012:319-320). As can be seen throughout the Pre-Dorset of the eastern Arctic (e.g. Hood 2008; Milne 2012), people were to a higher degree obliged to communally and spatially regulate lithic procurement and production.

A more standardised lithic production and exchange was also corollary to a standardised production, use and exchange of organic materials. Access to raw materials was in general characterised by tenured commitment to specific areas in the landscape and ‘down the line’ exchange networks (Jensen and Grønnow 2017:200). My projection is that as these materials were

assembled as portable tool kits, they would recursively make such human-environmental and human-human relations desirable.

Portable, composite tool kits have been prevalent throughout the human history of the eastern Arctic. The many qualitative similarities among these offers a formidable repertoire of formal analogies in terms of functionality (Grønnow 2017:44). However, the different ways these were assembled contributed to shaping qualitatively different relations between humans, materials, and the environment—regardless of functional similarities.

From these relations, historically unique Paleo-Inuit lifeways emerged. Whereas Jensen and Grønnow argues that the composite tool kits of Paleo-Inuit people were “the principal human media to connect to and engage in the world directly, mentally and metaphysically (Jensen and Grønnow 2017:200)”, I have now indicated through a Relational Approach that tool kits were *more* than that. Tool kits shared the world with people, co-creating relational histories that influenced how people behaved, perceived, and experienced it. Compared to my projection on how stone-using tool kits were involved during the Saqqaq period, tool kits during the Greenlandic Dorset helped create a different ontology—one where people desired transient over committed relation to the environment and its non-human beings. In this world, portable materialities were crucial coders of traditional lifeways.

This perspective would not be possible by examining archaeological objects as *a priori* by-products or mediators of social tradition. Doing so inadvertently projects a similar ontology to different traditions, one where technological and typological similarities through time always represent conservative behaviour maintained by rigid human-human relations (i.e. Grønnow 2017; Sørensen 2012). Inadvertently, we ignore the potentially subtle and unique complexities of historical relations and assume that only human-human relations counted as social relations at any given time (see Gravina, et al. 2012:6). Circumventing this bias, we can recognise that conservatism in Pre-Dorset and Early Dorset traditions emerged differently.

For people during the Early/Greenlandic Dorset, relations between humans and materials mattered more than human-environmental and human-human relations in maintaining homogenous ways of living across regions and through time. To elaborate this argument, we can reconsider Murielle Nagy’s assessment of how people lived during period:

“Throughout the human history of the eastern Arctic, some collector groups such as regional populations of the Dorset period, might have ceased, for sociological, demographic, and/or economical reasons, to exploit

the area where they identified themselves. I would expect the next people to come to an abandoned area, and which was thus new to them, to first exploit its resources in an opportunistic and foraging manner. This means that depending on their knowledge of an area, human populations were very likely to alternate between foraging and collector strategies. From an archaeological perspective, this would imply that sites created by foragers and collectors should alternate through time (Nagy 2000:203)”

To Nagy, these alternating strategies and the identity of people are predicated on the traditional knowledge of the land. She further argues that the knowledge of material culture, i.e. “tools in the mind” (cf. Ridington 1994), was more significant than the material culture itself (Nagy 2000:203). To me, this way of pivoting traditional knowledge of the landscape as the key factor for cultural change, *contra* eco-deterministic explanations, underserves the potential of materialities for influencing people’s lives during the prehistory of the eastern Arctic. Moreover, the explanation also relies on a linear perspective of time that does not consider the histories of actors (i.e. humans and their tool kits) prior to their arrival.

The lifeways interpreted here suggests that people during the Early/Greenlandic Dorset period were not geared to actively commit themselves to specific regions. Lifeways did not fluctuate between forager and collector strategies predicated on traditional knowledge of landscapes. Contrary to Nagy’s interpretation, I argue that materialities were far more significant than ‘tools in the mind’ or traditional knowledge of the landscape at the time. While tool kit materialities demanded specific tool designs and relations with the environment, it encouraged people to flexibly maintain these. Through lithic assemblages we can see this flexibility clearly in non-linear and expedient lithic production that supported prudent curation of stone-using tools. From this, I propose that the identity and worldviews of people at the time was primarily embedded in portable materialities, projecting these over vast areas and distances. Perhaps these identities and worldviews became further consolidated by the portable art that developed during the later Dorset periods (e.g. Sutherland 1997; Swinton 1967; Taylor 1967)?

The archaeological record clearly indicate that the Greenlandic Dorset period of Greenland was succeeded by a long period of abandonment, followed roughly 700 years later by a limited presence of Late Dorset communities in north-western Greenland. While reinforcing the idea that people during the period did not sustain a prolonged interregional occupation of the island, my study helps to explain *why*. It might also help to explain the sudden emergence of the broader Early Dorset phenomenon in the eastern Arctic.

The recent study by Savelle and Dyke (2014) on the demographic history of Paleo-Inuit people in Foxe Basin preceding the Pre-Dorset - Early Dorset transition suggests that even this presumed ‘core’ area of the eastern Arctic hardly maintained any stable continuum of human occupation. Noting the abrupt changes in population levels, dwelling placements and types, as well as artefact types, they suggest that the unique traditions and materialities of the earliest Dorset period did not develop *in situ* within the eastern Arctic, pointing towards a possible ‘origin’ from the Norton culture of the Bering Strait region (Savelle and Dyke 2014:272).

Taking these demographic patterns into consideration, the new perspective on the Greenlandic Dorset makes it conceivable that lifeways during the earliest Dorset period across the eastern Arctic were more mobile and expansive than has previously been interpreted. Instead of singular and static waves of colonisation, these likely involved constant ebbs and flows of people that in small groups explored and re-visited several regions at different times and in highly varied durations. These ebbs and flows were not totally defined by people enacting social tradition nor by the various ecologies and environments among different regions—they were also significantly defined by the constant presence of highly curated portable tool kits.

As in any period during its prehistory, tool kits were essential to survive and thrive in the vast regions of the eastern Arctic. The dynamic Paleo-Inuit lifeways that have been interpreted from the Greenlandic Dorset period highlights that tool kits themselves had even greater impact beyond this. As actively involved with people and their environments in assemblages of relations, tool kits significantly situated when, where, and how people procured their raw materials, produced their tool components, and subsequently maintained composite tools. During the Greenlandic Dorset, composite tool kits demanded prudent strategies of composite tool curation. These strategies relied on and perpetuated lithic raw material diversification as well as expedient temporal and spatial organisation of lithic production. In turn, these dynamics would historically and environmentally situate people into highly mobile and transient lifeways that required recurring long-distance dispersals and concentrations of groups within and between multiple different landscapes. Consequently, people and tool kits during the Greenlandic Dorset co-created lifeways that formed a distinct and uniquely ephemeral archaeological record.

6.2. Conclusion

The goal of this thesis has been to investigate the role played by lithics within composite tool technologies, and thereby create a better sense of how tool kit materialities played in actively shaping Greenlandic Dorset lifeways and culture-history. It offers three important contributions to the field of Arctic archaeology: Firstly, it is a comprehensive empirical case-study that provide a new and more dynamic understanding of how people and lithics co-created a unique period in Arctic prehistory. Secondly, it demonstrates that relational thinking is a useful framework for researching how tool technologies added historically significant structure to Arctic lifeways. Thirdly, it showcases how a Relational Approach that upgrades the *chaîne opératoire* methodology with concepts from Assemblage Theory can help us reach relational perspectives on Arctic lifeways through bottom-up and empirical investigation along a single line of archaeological evidence.

As stone-using tool kits supported the subsistence and survival of people, their continuous curation was essential. This curation was a relentless assembling/re-assembling of various tools that constituted tool kit repertoires. The crafting and maintenance of individual tools required the assembling of lithic and organic components, which converged multiple lines of production and component maintenance that emerged from different interactions with the environment and its non-human beings. Thus, tool kit materialities actively co-constituted assemblages of relations between people and their world, adding structure to how human-material and human-environmental relations unfolded over space and time. As inferred from regionally characteristic human-lithic relations, processes of tool kit curation structured Greenlandic Dorset lifeways by requiring: (1) Continuous adaptation of tool technologies to new and unfamiliar raw materials; (2) highly flexible skills in lithic production that could afford to the demands of diverse lithic raw materials and the crafting/maintenance of multiple different tool technologies; and (3) the preparation of component supplies by which people would expediently attend to the demands for maintenance exerted by tools without lithic production. Consequently, portable tool kits and their relentless demands for curation structured pioneering lifeways that drew people into rapid ebbs and flows of movement throughout varied Arctic environments – forming a brief and ephemeral period in Greenlandic prehistory.

This interpretation has based a new understanding of Greenlandic Dorset lifeways that rejects the principally Mind-on-Matter notion of these as defined by a highly conservative

technological tradition. Rather, by explaining how lithics were actively involved in dialectic and contingent relations with people and tool technologies, we can now see how Greenlandic Dorset lifeways was formed by historically significant relations between knowledgeable and skilled people, materials, and other non-human actors in different Arctic environments.

Still, typologies and standardised taxonomies for technological classification are needed and do work on a certain conceptual level. After all, they have played an important role in writing much of Arctic prehistory in regions where we have only a few dated remains, and lithics are among the few lines of data that offers deeper analytical potential. However, this creates its own conceptual traps and interpretative dead ends. I believe it is our failure as archaeologists if we limit our understanding of prehistoric lifeways to interpretations based on standardised techno-typological taxonomies. These will inevitably miss out on viewing the fundamentally dynamic relations between people and materials stated above. They certainly remain valuable for us to delineate and identify when and where important cultural changes occurred in the past, but we do ourselves a big disservice unless we consider how the richness and variability that can be described might also explain the dynamic formation of prehistoric living. I hope that this thesis can contribute towards opening out a deeper and more generalised appreciation of what we see but also what we are missing out on when we are non-critical of our terms and concepts. Within standardised and ‘objective’ taxonomies we lose sight of the unique and locally grounded lifeways that shaped diverse lifeways in Arctic prehistory.

To attain deeper interpretative levels of past Arctic worlds along available lines of data, we must consider how materialities exerted their own demands in complex and contingent relations with people and other beings in the world. This need could hardly be clearer than in the archaeology of the Greenlandic Dorset, where lithics of composite tool kits are among the few remains available from the period. A Relational Approach that retains methodological elements of the *chaîne opératoire* while upgrading its interpretative potential with Assemblage Theory offers a way to test our implicit and more problematic assumptions and move research and understanding of human living in the Arctic into more productive and regionally sensitive directions.

6.3. Research outlook

What shape might these new directions take? To answer this, I will first review and acknowledge areas in which the present approach might be improved or adjusted to different research questions. After this, I will briefly assess other circumpolar regions where a similar approach can provide valuable contributions to research.

The first and perhaps most obvious limitation of the Relational Approach is that it has largely neglected the spatial patterns that can be inferred from several lithic assemblages of the Greenlandic Dorset. While its focus on the temporalities of human-material relations has allowed me to include numerous lithic collections despite lacking or absent site descriptions, the reality remains that their past depositions always manifested spatial patterns in some form or another. Through lithic analysis framed by concepts from relational thinking, future studies on Greenlandic Dorset dwellings will be better equipped to explain how meaningful spatial patterns emerged through multiple temporalities and scales (see Vale 2017). This would have had important implications for how we understand dwelling practices during the period. As with the curation of portable tool kits, the continuous construction of dwellings was a crucial constant in the lives of people at the time. Future studies might therefore be able to elaborate on the converging effects these processes had on each other, allowing us to make even deeper and more complex extrapolations of how Greenlandic Dorset lifeways were structured by human-material relations. This might in turn give access to deeper insights into the social and cosmological ontologies of Greenlandic Dorset lifeways.

The present approach is also limited by how it extrapolates the functional role of lithics in composite tools. Whereas I have resorted to either analogy or assumption to infer the diverse functionalities afforded by stone-using tool kits during the Greenlandic Dorset period, incorporating use-wear analyses into my approach would arguably have added more accuracy and interpretative efficacy to these inferences (e.g. Chabot, et al. 2017; Dionne and Chabot 2006; Monchot, et al. 2013). Furthermore, such analyses would also have allowed the identification of manufacture traces to bolster interpretations of the temporal relations between different materials during tool production and maintenance (Wells, et al. 2014)

Another method that would have benefitted the present approach is portable X-ray Fluorescence (pXRF) analysis. Essentially, this method would have contributed by adding quantifiable and specific evidence of where lithics were sourced (e.g. Frahm and Doonan 2013;

Joyce 2011; Phillips and Speakman 2009; Williams-Thorpe 2008). In this regard, lithic assemblages from the Greenlandic Dorset period would be excellent targets for such analyses due to their wide variety of lithic raw materials. In practice, however, the use of pXRF would have to rely on targeted efforts into further surveying of regional lithic sources. If such efforts were made, the use of pXRF within the Relational Approach could provide more robust and nuanced interpretations on the emerging and interplaying relations between people, stone-using tool technologies, and different landscapes during the period.

Finally, it must be acknowledged that the present thesis is not an attempt to pivot its specific Relational Approach as a new standard approach to the study of prehistoric lifeways nor lithic remains. It has rather been an explicit attempt at demonstrating the usefulness of re-adjusting our interpretative frameworks in response to the specific archaeological records that we investigate. The archaeology of the circumpolar world bears many similarities but is by no means uniform. This is true in regard to the multiple scales from which different Arctic lifeways in prehistory as well as different histories of Arctic archaeological research has emerged. My thesis demonstrates how relational thinking can open up new fields of inquiry, allowing us to approach the archaeological record of the circumpolar world in ways that can challenge dogmatic views and provide novel understanding of dynamic lifeways.

Salient possibilities include other Arctic regions where rapid and expansive dispersals of highly mobile communities unfolded in prehistory. Specifically, studies framed by relational thinking might open new insights into how stone-using technologies historically structured the re-colonisation of Siberia during its late-glacial Upper Paleolithic period (e.g. Goebel 1999; Goebel 2002; Vasil'ev 2001); the post-glacial dispersals of people into Fennoscandia during its Mesolithic periods (e.g. Damm, et al. 2019; Hertell and Tallavaara 2011; Kankaanpää and Rankama 2009; Sørensen, et al. 2013); as well as the deep and dynamic prehistory of northeastern Asia that facilitated numerous population dispersals through the Arctic of North America to Greenland (e.g. Coutouly 2016; Easton, et al. 2011; Kuzmin, et al. 2007; Mason and Rasic 2019; Otsuka 2017; Takakura 2012, 2020)

While the stated examples are broadly encompassing, they represent only a fraction of the rich prehistory of the northern circumpolar world. However, through relational frameworks we can study this richness with new and original research questions. This would generate case-studies that can include multiple elements of historically and regionally unique archaeologies to offer far more

dynamic perspectives that counterbalance the enduring macro-scale focus on traditions and their culture historical dynamics. In turn, using relational thinking offers a new scale and character of insight that offer a deeper appreciation of the diverse and interconnected human and material pasts that continue to shape human existence and experience of the Arctic regions.

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Appendix A - Lithic assemblages from Qeqertarsuup Tunua (Disko Bay)

Figure 18: Measurements of intact burin-like tools included in Chapter 3.

7.1. Annertusuaqqap Nuua

7.1.1. Endblades (n=94)

In total, 94 specimens in the assemblage from Annertusuaqqap Nuua were classified as endblades. 92 specimens were of MCQ, while two were of grey *killiaq*. The classification of the two *killiaq* specimens as endblades was tentative due to fragmentation and otherwise lack of discernible technological characteristics.

22 specimens were complete. The various types of fragmentation identified among the remaining endblades are as follows: short distal (11); long proximal (16); short proximal (26); long distal (6); and medial (12). Three pairs of fragments were refitted. Each refitted pair were of two fragments recovered adjacently at the site. The first pair were collected from x508/y520 (AN4) and

Figure 19: Measurements of endblade specimens from Annertusuaqqap Nuua.

x509/y520 (AN5). The second pair of refitted fragments were collected at x511/y517 (AN46) and x511/y519 (AN47). The third pair of fragments were collected from x511/y519 (AN89) and x510/y519 (AN90). It is possible that the fragmentation of the three refitted endblades are due to post-depositional factors, as there are no clear indicators available to infer intentional breakage of the objects.

The specimens exhibited a variety of morphologies, including oval (17), triangular (11), triangular-oval (23), and rectangular-oval (6) types. 17 specimens featured corticated surfaces (Table 41).

Endblade specimen AN 6 is an example of efficient raw material utilisation is specimen AN6. It has been made from white MCQ, featuring a high amount of cortex with limited but careful flaking removals. The observed qualities of the specimen suggest a highly efficient utilisation of raw material. It seems that it was more important to make a component of a shape and size suited for a specific composite tool, rather than a component that could be sequentially rejuvenated over time.

A similar, yet different, endblade was identified: Specimen AN40, also made from white MCQ and with a triangular morphology. The endblade exhibits distinct combinations of technological traits that are easily associated with a protracted stage of tool component use and rejuvenation. This has previously been noted by Sørensen, who showcase the specimen as an example of the latest stages of the endblade operational-chain (2012:200). Defining traits include the relative size of removal scars between the proximal and distal area, and the short distal length compared to the proximal length. As such, it can be inferred that the specimen was subjected to rejuvenation after it was hafted as a composite tool component. This indicates a different temporality of tool production and use compared to specimen AN6. Afforded by the mass of the component, its possessor decided to dedicate effort into rejuvenation rather than replacing it. These

Table 41: Endblade specimens with corticated surfaces from Annertusuaqqap Nuua.

Specimen	MCQ type	Fragmentation	~% of cortex
AN5	Blue-white	Long proximal	20
AN6	Blue-white	Complete	60
AN15	Red-brown	Long proximal	40
AN16	Blue-white	Complete	30
AN22	Red-brown	Long proximal	30
AN31	Blue-white	Short proximal	20
AN33	Grey	Short proximal	45
AN34	Blue-white	Short proximal	40
AN41	Blue-white	Short proximal	50
AN44	Blue-white	Short proximal	20
AN48	Red-yellow	Short proximal	15
AN61	Blue-white	Long proximal	50
AN65	Brown-yellow	Long distal	15
AN77	Blue-white	Short proximal	15
AN86	Light grey	Complete	40
AN90	Blue-white	Long distal	40
AN93	Blue-grey	Complete	20

efforts were likely afforded prior to the site occupation, where the person had to be more considerate about the supply of lithic components.

7.1.2. Endscrapers (n=26)

26 specimens in the Annertusuaqqap Nuua assemblage were identified as endscrapers. All but one specimen of grey *killiaq* were made from variations of MCQ (Table 2). Both unifacially (15) and bifacially (11) knapped specimens were identified. The majority of specimens featured an edge angle at ~70-80°. Each of the established conceptual stages of production were identified among the specimens. Four specimens were assigned to stage 1 (preform). Six were assigned to stage 2 (early tool stage). Nine specimens were assigned to stage 3 (middle tool stage). Seven specimens were assigned to stage 4 (late tool stage).

16 endscraper specimens feature flared edges. Flared, concave edges are among the most distinctive features of Greenlandic Dorset endscrapers, and is associated with the second and third stage of the conceptual scheme. Considering the deliberate knapping procedures required for producing flared edges, it was expected that specimens with this attribute also exhibited other indicators of protracted stages of tool shaping/rejuvenation. In this regard, evidence of bifacial knapping and/or basal fluting is considered such indicators. As these attributes are generally identified in the proximal area of Greenlandic Dorset endscrapers, their occurrence suggests strategic reduction of mass that would mitigate the need for extensive unifacial knapping. While this may seem like a convoluted description of a seemingly basic rationale, it is used here to initiate an examination of how endscraper attributes are associated with various ‘stages’ of tool use.

Flared edges as a distinct morphological trait associated with a specific stage of production will here be problematised by comparing specimens with and without the trait to explore variation within the group of artefacts which in turn might broaden our perspective on endscraper component production and use. To further explore the relation between raw material use and the *chaîne opératoire* of lithic endscraper components, the degree of heat treatment and frequency of cortex is also considered.

Specimens with flared edges

In total, the sixteen endscrapers with flared edges (which includes one specimen of *killiaq*) featured nine (56,2%) bifacially knapped specimens and five (31,2%) specimens with basal fluting. Three

of the fifteen MCQ specimens with flared edges featured a total surface area with ~10% cortex (AN4, AN5, and AN12). The remaining surface of the three specimens were knapped after heat-treatment. When comparing visible degrees of heat-treatment within the selection, three of the fifteen specimens are seen to feature no visible signs of knapping post heat-treatment (AN9, AN20, and AN22). Another three specimens (AN8, AN16, and AN23) had some degree of surface without knapping scars after heat-treatment: Two specimens on the ventral surface, the third around the distal area. None of these specimens were bifacially knapped, nor basally fluted.

Specimens without flared edges

In total, the ten endscrapers without flared edges featured two (20%) bifacially knapped specimens and two (20%) with evidence of basal fluting.

Of the ten endscrapers without flared edges, two specimens featured cortex: Specimen AN19 with a ~10% corticated surface and AN25 at about ~40%. Based on size, typology and technological attributes, specimen AN19 was designated to the ‘preform’-stage of the endscraper *chaîne opératoire*. Specimen AN25, despite its high amount of cortex, was classified as belonging to the final stage 4. In total, 60% of the specimens featured a full surface knapped after heat-treatment. Two specimens had not been knapped post heat-treatment, while two specimens featured only a dorsal surface knapped post heat-treatment. All the four specimens without full surface knapped post heat-treatment were classified as belonging to the preform stage 1.

Figure 20: Measurements of endscraper specimens with and without flared edges from Annertusuaqqap Nuua.

Judging from the relative sizes of Greenlandic Dorset endscrapers, it appears that specimens with flared edges are often within the medium range of sizes, compared with the total amount of specimens. While scrapers without flared edges are found in any size along the spectrum, comparing the general technological characteristics of specimens with flared edges suggests that these were made according to specific qualitative preferences (and possibly to a specific functional purpose), rather than being exclusively a middle-stage in a conceptual operational-chain. The design preferences would in this regard likely be according to the size and dimensions of the haft, or to a pertained functional purpose.

7.1.3. Sidescrapers (n=3)

The specimens are all intact and have been made from blue-white MCQ. Specimen AN1 is notably larger than the others (l: 45,7; w: 14,2; t: 7,8 mm), while specimen 2 and 3 are similar in size (l: 27,9; w: 9,0; t: 3,8 mm and l: 26,3; w: 13,6; t: 5,3 mm respectively). Specimens AN1 and AN3 have been bifacially knapped, while specimen AN2 only feature unifacial removal scars. The

ventral removals of the bifacially knapped specimens are predominantly basal removals by fluting. The ventral surface of specimen AN2 features a matted surface that has not been knapped after heat treatment, suggesting that the sidescraper was made from either a natural flake or a small flake knapped prior to heat-treatment. Only the fluted basal area of specimen AN3 appears to have been knapped after heat treatment.

While the three sidescrapers are typologically resemblant, they exhibit inconsistent technological attributes. Their different measurements suggest that they were fitted into composite tools of different sizes. Besides the distinct curved scraper edge and removals made to accommodate hafting, the technological and morphological characteristics of the three specimens suggests that each of the three sidescrapers was expediently produced.

7.1.4. Burin-like tools (n=52)

The assemblage features a large quantity of typologically distinct burin-like tools, 52 in total. 50 specimens were made from *killiaq*, and 2 from MCQ. *Killiaq* specimens are exclusively of the brown-grey Nuussuaq-type. The two burin-like tool-like tools of MCQ were of a blue-grey and brown-grey type. While most burin-like tools were easily identified due to the distinct characteristics of the tool category (Sørensen 2012:197-198), several specimens allowed only tentative classification primarily due to fragmentation. The burin-like tools of MCQ were identified according to general typological similarity along with the technological attribute of a polished working-edge. The degree of edge polish varies, as some specimens feature retouch removal scars together with polish. It is difficult to determine if the retouch scars are remnants of the preform stage, or if potential stages of rejuvenation included edge retouch as well as polishing.

22 specimens of *Killiaq* were intact, while the remaining featured the following types of fragmentation: short distal (8); long proximal (3); short proximal (2); long distal (7); medial (8). Two pairs of fragments were refitted: One pair into a complete specimen (AN16 and AN17), and another pair into a long distal fragment (AN40 and AN41).

Specimen AN24 was the only one to be classified as a burin-like tool preform due to a complete lack of polished surface. Despite the lack of polish, it still features a distinct ‘working edge’ area that makes up 52% of the total specimen length. Approximately 40% of its surface is covered by cortex, representing only one of four specimens with remains of a corticated surface. Its measurements make the specimen a relatively small preform for a burin-like tool (l: 36,8; w:

13,5; t: 6,3 mm). Furthermore, the significant amount of cortex along with its measurements indicates that the original *killiaq* nodule was relatively small.

37 specimens featured a polished working edge, while a total of 8 specimens featured no polished edge. Following to the general concept of the Greenlandic Dorset burin-like tool, the eight specimens without a polished working edge are atypical. Five of these are complete, whereof only a single specimen (AN24) features no polished surface at all. Specimen AN2 features no polished working edge, yet ~50% of its total surface have been polished, with four distinct polished surfaces. Specimen AN3 is an example of a MCQ burin-like tool without a polished working edge, but still features a single distinct polished surface covering ~20% of the total specimen surface. Three possible reasons for the specimen's lack of working edge polish are here considered: The first is that these were unfinished tools (i.e. preforms); the second that they were rejuvenated by edge retouch but discarded before polish was added; the third that the specimens were useable but were discarded, nonetheless.

7.1.5. Sideblades (n=6)

The scarce few sideblades (6) of MCQ identified in the assemblage are most notably characterised by the variability in raw material colour and homogenous sizes. The raw material variability among the specimens include following colour-types: green (1); blue-white (3); and grey (1). A single specimen has a burnt surface. Artefact sizes ranges from ~18,5 mm to ~25,5 mm in length, ~12,5 mm to ~21,5 mm in width, while only marginal difference in thickness ranging between 3,2 to 2,6 mm.

7.1.6. Microblades (n=368)

Overall, the microblade specimens from AN typically featured shared traits such as a minute platform, no bulbar scar, a ventral bulb with a lip formation at the platform edge, and a front preparation by trimming and/or abrasion. The specimens featured a wide variety of fragmentation types: complete (125); short distal (9); long proximal (103); short proximal (4); long distal (65); and medial (59).

The microblade specimens feature a wide variety of dorsal blade surfaces. The following variants were identified: Two dorsal surfaces, one covered in cortex (3); Two dorsal surfaces, both negative removals (113); Three dorsal surfaces, all negative removals (166); Four dorsal surfaces,

all negative removals (44); Bilaterally crested surface (11); Two dorsal surfaces, one surface laterally crested (17); Three dorsal surfaces, one surface laterally crested (9); Two dorsal surfaces, one covered in cortex and one laterally crested (1).

141 microblade specimens feature retouch. The retouch is generally made bilaterally on the proximal area. The technological characteristics of the microblade knives hardly differs from specimens without retouch in the assemblage. Prior to the analysis, the frequency of crested dorsal surfaces—generally associated with early stages of production or stages of core rejuvenation—was expected to be lower within this category of microblades, as these typically irregular traits might be assumed undesirable for composite tool integration. Among microblades with retouch, five specimens feature bilaterally crested surfaces; six specimens with two dorsal surfaces, one surface crested; and four specimens with three dorsal surface, one surface crested. The frequency ratio of crested surfaces among either microblades and microblade knives are both approximately 1:10 (24:242 for microblades and 15:141 for microblade knives). This similar frequency might suggest that surface regularity was not consequential to the hafting of microblade components.

Although far more intuitive, the estimations of dorsal surface regularity are worthwhile to consider when comparing microblades with and without retouch. The degree of regularity was determined by an assessment of the direction and quality of the dorsal surfaces. Corticated and crested surfaces have been categorised as irregular, although between themselves the crested specimens can also be compared by regularity (discussed below). Specimens without cortex or cresting are evaluated based on the quality of the negative dorsal scars, i.e. scar direction. Parallel ridges signify regularity, while crossing ridges signify irregularity.

62 microblades without retouch were identified as irregular (25,6%), 135 as regular (55,7%), and 24 as extremely regular (9,9%). For microblades with retouch, 32 were irregular (22,6%), 93 regular (65,9%), and 14 extremely regular (9,9%). Comparing the proportions of the different categories, the different frequency of regularity type is here considered inconsequential. Conclusively, based on dorsal surface characteristics and degree of regularity, it is argued that the qualities of the dorsal surface were insignificant for the viability of a microblade to be used as a tool component, as long as the general morphology of the object was within acceptable standards. No corticated surfaces were observed among the microblade knife specimens, which reflect the overall rarity of specimens covered with cortex (4 out of 368).

190 of the total 368 specimens featured a distal area indicating removal termination. The majority (129) of the microblades were “ideally” detached, i.e. that the removal mass and trajectory would not have impaired subsequent knapping procedures. The second most common removal termination type was feathered removal (36). The remaining specimens featured plunged (21) or hinged (3) removal terminations.

Microblade specimens exhibiting traits associated with knapping error were few. The most typically associated trait—hinged removals—were identified on three specimens only. While plunged removals are also typically considered knapping errors, the examined microblade specimens from Annertusuaqqap Nuua frequently exhibits a curved distal area with moderately excessive mass which at times was difficult to distinguish from a plunged removal. This trait is considered the combined result of knapping method and raw material size. Adding the typically low platform-to-front angle and short length of the specimens into consideration, these traits are easily associated with the small microblade cores with low angled removal fronts identified in Greenlandic Dorset assemblages from Qeqertarsuup Tunua (Sørensen 2012:213). The few specimens with remains of a corticated surface generally features this trait, most often as a flat surface at the distal end. The combination of these traits is frequent and distinct enough to indicate that the methods of microblade production did not significantly reduce the size of serially knapped microblades. It also indicates that people prepared microblade cores of different sizes, most likely to produce microblades for different composite tools.

The assemblage features three distinct microblade specimens of an unusual black type of MCQ with yellow inclusions (specimen AN4, AN5, and AN6). The three specimens are among the largest in the assemblage, measuring between 35 to 49 mm in length, and ~8,5 mm in width. The two largest specimens were refitted, while the third specimen can only be assumed to have been made from the same core, based on highly similar technological attributes and raw material. Three additional specimens of similar raw material were collected in the vicinity, but their fragmented state makes it difficult to determine if they were knapped from the same core, although it is conceivable. While it is possible that associated flakes of the same raw material are present in the flake assemblage, the absence of traces related to microblade core front preparation suggests that the three specimens were deposited after an event of successful knapping removals made on a core that would later be transported off-site along with the microblades selected as tool components.

7.1.7. Microblade cores (n=7)

Two MCQ specimens (AN4 and AN6) feature ~30% surface cortex. Platform-to-front angle among the specimens is generally observed to be ca. 70-80 degrees. The negative removal scars seen among the specimens exhibit a variety of core front exploitation. Three specimens have seen microblade detachments from a single front exclusively. Two specimens feature two separate (unidirectional) fronts of negative removals. A single specimen has been exhaustively knapped from three distinct unidirectional fronts, with a total of 21 identified negative removal scars. The remaining specimen feature no distinct area of negative removals. Only a single removal scar on its surface can be considered a typical microblade removal scar. The irregularity and general size of its remaining removal scars suggests that the core was in a process of preparation/rejuvenation until a large hinge fracture occurred.

Hinge fractures are the most frequently observed blade removal termination among the specimens. A total of 5 specimens were discarded after a hinge. Specimen AN3 features a final hinge termination on both of its separate removal fronts. Judging from traces of preparation removals, the knapper did not interchange between knapping the two fronts but knapped exclusively from a single front until the error occurred. A single microblade core features a feathered removal as its final termination. The removal was made after a hinge fracture and is likely a failed attempt at rejuvenating the blade removal front. Another example of a failed attempt at rejuvenation is seen on Specimen AN4, where the apparent attempt at removing a hinged surface resulted in a new hinge.

7.1.8. Adzes (n=25)

A total of 25 adze specimens were identified. 23 specimens have been made from *killiaq*, whilst two specimens of MCQ have been tentatively categorised as possible adze specimens. Twelve specimens were intact, while the following types of fragmentation was identified: Short distal (2), long proximal (1), medial (1), and long distal (7). Proximal fragments are defined by the presence of a platform and bulb of percussion from the original flake preform.

The adze assemblages feature the highest proportion of intact specimens in the present study. The specimens indicate that each was produced from an individual nodule. Ten specimens exhibit remains of the original cortex. All except a single specimen has been bifacially knapped. The adze specimens from Annertusuaqqap Nuua are characteristic by their typically crude and

irregular removal scars, present on all specimens of different sizes. Measurements of intact specimens range from 113,5 mm to 36,3 mm in length, 60 to 18,6 mm in width, and 27,1 mm to 9,4 mm in thickness. Traces of edge polish is seen on seven of the intact specimens, indicative of tool use.

Specimen AN12 exhibits the largest amount of polished surface among the adzes, at ~25% surface coverage. It also features the most regular and evenly distributed removal scars seen among the specimens. Its characteristics indicate that the specimen was at a protracted stage of component use, having been rejuvenated on several occasions during circulation prior to the site occupation.

7.1.9. Large flakes/preforms (n=9)

A notable example of possible endblade preforms is a refitted set of three large flakes. The flakes are of relatively poor quality MCQ, and their deposit is considered a result of this. The first removal of the refitted sequence is of a large amount of corticated surface. Subsequently, the flake from which the cortex was removed would be fragmented into two pieces. Both fragments exhibit subsequent attempts at bifacial knapping. Although only a few removals were made before the flakes were abandoned, their direction and position are nonetheless indicative of an intended design associable with endblades. The refitted sequence of removals combined with their technological attributes provides evidence of on-site endblade production.

7.2. Innartalik

7.2.1. Endblades (n=3)

It is not possible to ascertain what caused the fragmentation of the two refitted endblade fragments. One possibility is that it fragmented during on-site use. Another is that the flakes represent an episode of on-site tool rejuvenation. The first inference would imply that the original artefact was transported away from the site after fragmentation without being subjected to rejuvenation. The second inference suggests that a person attempted rejuvenation, but that it resulted in severe removals of the polished distal area. The lack of discernible characteristics that would indicate the flakes as knapping removals (e.g. a bulb of percussion and ventral ripples) favours the former outcome. However, such traits are obtuse on *killiaq* material.

7.2.2. Endscrapers (n=3)

The degree of visible heat-treatment of the endscrapers could indicate their respective positions in the operational-chain. Together, the three endscrapers exhibits a potential for variability in Dorset heat-treatment practice. The largest and the smallest specimen (IN1 and IN3) corresponds well with the typically inferred relation between heat-treatment and pressure-flaking in Dorset MCQ technologies. Specimen IN2, on the other hand, offer some nuance to this idea.

The deliberate removal of flakes from the distal working edge suggests an expedient application of heat-treatment for the shaping of lithic components. It appears that it was enough to only remove flakes from the distal working edge after heat-treatment for the component to attain its desirable form. If heat-treatment was essential for the pressure-flaking of MCQ, the limited number of heat-treated removals would suggest a relatively small difference in size between original preform and final design. However, the removals made prior to heat-treatment suggests that the knapper was able to perform minute flaking by pressure flaking without being strictly dependant on the technique. These observations call for continued experimental and empirical research with a focus on the use of heat-treatment during the Early/Greenlandic Dorset.

7.2.3. Burin-like tools (n=1)

The assemblage of Innartalik features only a single burin-like tool of grey *killiaq*. The specimen represents the only diagnostic artefact made from *killiaq* in the assemblage. It is a complete specimen (l: 26; w: 12 mm) with a left-sided polished working edge that makes up a total of 53% of its total length.

7.2.4. Microblades (n=21)

Of the 21 microblades from Innartalik, 9 were made from quartz crystal, and 12 from MCQ. Two of the retouched microblades were of quartz crystal, with only a single retouched microblade made from MCQ.

In general, the technological characteristics related to sequences of microblade knapping are homogenous; the majority of the 21 microblades have a regular dorsal surface, discrete rippling of the ventral surface, a bulb with lip formation, small and plain blade platform with an angle less than 80°, and a blade front prepared by either a combination of trimming and abrasion, or abrasion only.

The regular microblades of quartz crystal from Innartalik featured two (3) or three (4) parallel dorsal blade scars. Only two specimens of quartz crystal were identified as irregular, one with two negative scars and a single specimen with two parallel blade scars alongside the remains of a crested surface. The regular microblades of MCQ had either two (4) or three (6) parallel dorsal scars, while the two irregular blades featured two and three dorsal scars respectively.

The fragmentation of microblades made from MCQ is more varied than those of quartz crystal and includes two short proximal and two medial fragments. The most significant pattern is the *lack* of specific types of microblade fragments – especially short distal fragments. Equally notable is the lack of short proximal fragments among microblades of quartz crystal. The missing short distal quartz crystal microblade fragments could be explained by crushing during pressure-knapping.

7.2.5. Flakes (n=98)

The flakes were measured by general size classes rather than exact measures. Most flakes of all raw material types are between 0-1 cm in size, with small flakes of MCQ types having the highest proportion. Fewer in number, the flakes of *killiaq* are more varied in size, including the largest

flake specimens of the assemblage. The flakes of quartz crystal are fewest in number, with the majority designated into the smallest size category.

The small sizes of flakes made identifying technological variation between flake types difficult. In his analysis of the lithic assemblage of Innartalik, Jensen defines most flakes from Innartalik as retouch flakes by their small size. Following the technological typology of Sørensen, the flakes of MCQ measured between 0-1 cm would generally be defined as flakes from bifacial knapping. However, defining small, typically pressure-flaked, flakes as either retouch- or bifacial flakes denotes operations associated with specific artefact types. It should be kept in mind that the flakes may just as well be from pressure-flaking of items such as end-scrapers, which are either unifacially or bifacially shaped and retouched.

Furthermore, the minute flakes do not necessarily reflect typical retouch either, as the negative removals of 'finished' lithic components indicate that flakes from shaping could have been as small as between 0-1 cm. Whether the flakes of MCQ can be related to retouch or shaping, production or rejuvenation, the distinction is arbitrary at best. Furthermore, by corresponding these observations with the analysis of MCQ diagnostic artefacts, the blurred line between retouch and shaping becomes even more emphasised. By general identification of typical technological attributes, the flakes of MCQ have been categorised as pressure-flakes.

The majority of *killiaq* flakes are here regarded as deposited by shaping and/or rejuvenation of components subsequently transported elsewhere.

7.3. Umiartorfik A

7.3.1. Endblades (n=11)

Ten specimens are bifacially knapped, with a single unifacial specimen as the only exception. A single bifacially knapped endblade specimen of grey *killiaq* was identified, as well as a specimen of finely grained quartzite. Oval (3) and triangular-oval (2) types were both present in the material – the remaining specimens were too fragmented to allow identification of morphological type. None of the specimen feature cortex.

The following types of fragmentation were identified in the endblade assemblage from Umiartorfik A: A single complete specimen, two short distal fragments, four long proximal

fragments, a single short proximal fragment, a single long distal fragment, and two medial fragments. Each fragment represents individual specimens.

Specimen UMA3 is a rare example of a quartzite endblade from the region of Qeqertarsuup Tunua. It is the largest endblade collected from Umiartorfik A (l: 38,3; w: 20,5; t: 6,1 mm). It exhibits typical traits associated with Greenlandic Dorset endblades, predominantly at its proximal area which is distinctly notched. The specimen is bifacially knapped, although the raw material quality makes identification of individual removal scars virtually impossible. While a regional provenance cannot be excluded, the rare raw material of the specimen suggests that it was transported to the site from outside the region. Considering the geology of western Greenland (see part 3.1.1.), it can be assumed that the object was originally procured further to the south where quartzite is more abundant.

The *killiaq* specimen (UMA8) categorised as an endblade is a long medial fragment. The bifacial removal scars are characteristically crude, but the knapper did nonetheless achieve an oval morphology. The lack of polish suggests that the artefact would have been a small preform (l: 9,2; w: 13,2; t: 2,5 mm), an expediently crafted atypical specimen, or crafted by an inexperienced knapper.

Specimen UMA1 is notable for its delicately distributed negative removal scars, indicating deliberate and skilfully performed knapping. At first glance, the artefact could easily be mistaken for a small sideblade, but on closer inspection the remains of a fragmented proximal base can be observed. The distinct oval morphology along with the delicate series of negative removals suggests that the artefact was either curated and rejuvenated with outmost care, or that the artefact was only intended to be of its approximate size to accommodate a desired tool design- and function. The width of the remaining proximal area suggests that the hafting base would have been small. The specimen supports the idea that the variability of endblade morphologies observed among Greenlandic Dorset lithic assemblages is not connected to separate stages of endblade production, but rather represent a variety of forms and designs.

7.3.2. Endscrapers (n=1)

A single endscraper was identified in the assemblage from Umiartorfik A. It is sizeable, measuring l: 47,4; w: 30; t: 7,8 mm, making it the largest endscraper specimen in the present study. As seen on other larger endscrapers, it has a straight front edge, a slight ventral curvature, and a tapering

proximal area ending in a rounded base. Removals after heat-treatment have been made at the ventral proximal area, presumably for hafting. The remaining ventral surface is the remains of the original ventral flaking surface, knapped prior to heat-treatment.

7.3.3. Burin-like tools (n=8)

The fragmentation observed among the remaining specimens are as follows: Long distal (2), short distal (2), long proximal (1), and short proximal (1). The short proximal fragment was the only burin-like tool without a working edge. A complete working edge was present on each of the two long distal fragments, as well as on the MCQ specimen.

The polished working edge of the MCQ burin-like tool measured approximately 61% of its total length. Polished surfaces were identified on all but one specimen.

7.3.4. Sideblades (n=5)

Five sideblades were initially identified during the analysis. Four have been made from blue-white MCQ, and a single of a brown-yellow type. Except for a possible sideblade preform, the sideblades were predominantly deposited during tool kit maintenance, where lithic components were replaced, or entire composite tools were discarded. None of the specimens have been fragmented. Specimen UMA2 and UMA4 share similar technological traits and measurements (l: 25,1; w: 17,5; t: 3,1 mm and l: 21,1; w: 19,9; t: 3,8 mm). Specimen UMA1 is a relatively large and crude sideblade specimen (l: 36,8; w: 25,8; t: 5,3 mm), while the small, elongated shape of Specimen UMA3 (l: 24; w: 10,1; t: 5,5 mm) suggests that it has been rejuvenated on at least one occasion.

While most of the specimens are of similar raw material, they exhibit some variability in size measurements and technological characteristics. Sideblade specimen UMA3, is unique both in terms of raw material and size. Made from a brown-yellow type of MCQ, it is also the only fragmented specimen in the sideblade assemblage. Another unique sideblade is specimen UMA1—the largest sideblade identified in the present study. In addition to its size, the removals scars on both sides are atypically crude, including several small hinge fractures that could represent novice knapping operations. From this, the specimen is considered a sideblade preform.

7.3.5. Microblades(n=17)

The various types of fragmentation differ between microblades of MCQ and quartz crystal. Four microblades of MCQ and one of quartz crystal were intact. The only type of fragmentation exclusive to microblades of quartz crystal was short distal fragment, with three specimens identified as such. Short proximal- and medial fragments were exclusively of MCQ, one and two specimens respectively. The majority of microblades have dorsal surfaces featuring two or three plain negative scars. One microblade of both MCQ and quartz crystal feature two plain scars along a single corticated surface. A single microblade feature a plain scar along a corticated surface, and a single specimen feature a plain scar along a crested surface. Both specimens have been made from MCQ.

Three specimens of quartz crystal microblades were categorised as irregular, while four specimens featured relatively regular surfaces. In comparison, microblades of MCQ are generally more regular. A total of four MCQ specimens were categorised as irregular, while the remaining six were regular (4) or extremely regular (2). Between the sites included from the region, this proportion of irregular MCQ microblades could be considered high. It is here pertinent to keep in mind the issue of the discrepant amount of microblades included in the present analysis.

Specimens with a remaining proximal area generally featured technological characteristics conforming to the typical Dorset microblade. Among MCQ specimens, the proximal area is characterised by a combination of a small bulb and lip formation, small platform surfaces with no facets with a platform-to-front angle at approximately 70 to 80°, and a platform edge prepared by abrasion or trimming with abrasion. The two quartz crystal specimens shared similar characteristics.

7.3.6. Flakes (n=957)

See part 3.4.4.

7.4. Umiartorfik B

7.4.1. Endblades (n=66)

The following types of MCQ endblade fragmentation were identified: Short distal (9); long proximal (8); short proximal (13); long distal (12); and medial (2). The following types of *killiaq* endblade fragmentation was observed: Short distal (4); long proximal (2); short proximal (2); long distal (4); and medial (2).

Specimens of MCQ exhibit a large variety of colour types, divided into the following groups: blue-white (31); green (3); red-brown (3) brown (2); light brown (4); grey-brown (2); and grey (5). Eleven endblades of MCQ were classified as intact specimens. Each fragment represents individual specimens. Identified endblade morphologies include oval (12), triangular (3), and triangular-oval (19). Endblade specimens from Umiartorfik B featuring corticated surface

Several *killiaq* specimens could only be tentatively categorised as endblades. One reason for this is the ambiguous characteristics of large, possible preform specimens, some of which might just as well be related to adze- or burin-like tool production. Another reason is that the amount of surface polish varied significantly between polished specimens. Furthermore, the absence of complete specimens also inhibited definitive classification.

Endblade specimen UMB35 (measuring l: 19,5; w: 12,5; t: 2,9 mm) of blue-white MCQ has been bifacially knapped as well as basally fluted. Judging from its raw material quality, it appears to have been knapped without heat-treatment. The specimen indicates successful and skilful knapping operations *without* heat-treatment. The diagonal fragmentation seen at the distal

Table 42: Endblade specimens from Umiartorfik B featuring corticated surface.

Specimen	MCQ type	Fragmentation	~% of cortex
#UMB6	Blue-white	Short proximal	20
#UMB7	Blue-white	Short proximal	30
#UMB10	Blue-white	Long proximal	50
#UMB11	Brown	Long distal	20
#UMB16	Blue-white	Long proximal	60
#UMB38	Light brown	Complete	30
#UMB54	Blue-white	Long proximal	25
#UMB62	Blue white	Long distal	30

area of the originally oval specimen suggests breaking during use. A distinct, diagonal fragmentation is also observed on several other endblade specimens in the assemblage.

Whereas most of the endblade specimens would have been deposited during the maintenance of multiple composite tools, a possible endblade preform appears to have been discarded due to unsuccessful knapping. Specimen #16 is a large, unifacially knapped, long proximal fragment of blue-white MCQ (measuring l: 34,6; w: 21,9; t: 7,7 mm). Most of its surface is corticated, and it also features a few removals made prior to heat-treatment. Its characteristics indicate that it was discarded during failed production due to fragmentation.

7.4.2. Endscrapers (n=15)

The endscraper specimens in the site assemblage from Umiartorfik B represent almost every stage of Sørensens conceptual *schema opératoire* for Greenlandic Dorset endscrapers. None of the specimens were assigned to the category of preform (stage 1). Five specimens, including the grey *killiaq* and the tricoloured MCQ endscrapers, were identified as belonging to the ‘early tool’-stage of the operational-chain. Four endscrapers have been assigned to the middle stage of tool utilisation (stage 3). The remaining four specimens were assigned to the late stage of tool utilisation (stage 4). Six out of thirteen endscrapers have been bifacially shaped, all of them belonging to stage 2 and 3 of the endscraper *chaîne opératoire*. The majority of unifacially knapped endscrapers (57%) belong to stage 4 – the supposed late stage of endscraper use.

7.4.3. Sidescrapers (n=7)

Seven lithic artefacts from Umiartorfik B of MCQ were classified as sidescrapers. Five specimens were collected within the structural remains, while two were collected along the beach. The specimens are all intact except a fragmented long distal specimen. Only two specimens have been bifacially knapped. In general, the angle of the working edge is between 80 to 90°. The working edge on all but a single specimen has been produced on the left dorsal side.

Specimen sizes vary, with measurements ranging between 26,8 mm and 45 mm in length, 10 mm to 20,1 mm in width, and 5 mm to 8,6 mm in thickness. Variations of proximal morphology were observed. A noticeable trait is the tapering shape of several specimens, which is typically associated with sidescrapers made in the Saqqaq tradition for sidescraper-production. However, this qualitative assessment is difficult to quantify, as the degree of tapering is highly varied amongst

specimens. By their role as tool components, it is considered plausible that the haft area design variation was highly influenced by composite tool design.

7.4.4. Burin-like tools (n=10)

In total, the assemblage features 6 complete burin-like tools. Two specimens were identified as long proximal fragments. A long distal and a long proximal fragment were also present. All specimens but one has a working edge on the left side. The working edges are all polished, apart from Specimen UMB12.

The refitted specimen UMB2/3 is a complete burin-like tool from two fragments of grey *killiaq* refitted at the basal, proximal area. The artefact displays most of the typical characteristic associated with the burin-like tools of the Greenlandic Dorset. The working edge is located on the left side and makes up 60% (42,3 cm) of the total artefact length. Its entire distal surface is polished, and the proximal area has been bifacially shaped with basal fluting. The most notable aspect of the artefact is its clear typological and technological features combined with its significant size. Its distinctive characteristics strongly suggests that it was integrated into a composite tool and was deposited during composite tool maintenance by replacement. However, the remaining mass of the distal fragment would still have been a suitable preform for a smaller burin-like tool. It is thus conceivable that there was no immediate need for a smaller burin-like tool when the specimen was fragmented. One possible reason could be that no complementary tool components (i.e. a handle) were available. Another (potentially related) reason could have been that there already were enough burin-like tool components of smaller size available, negating the need for production. The possibility that the object was cached for potential future re-actualisation as a tool might also be considered. The same people – or others sharing similar tool kits and traditional knowledge – would easily have recognised the artefact, and re-incorporate its raw material into another tool kit.

At the opposite end of the size spectrum among the burin-like tools examined in the present study, is specimen UMB6 is among the smallest (l: 22,3; w: 6,8; t: 3,4 mm). The distal edge appears to have been fragmented, and thus the specimen has been classified as a long proximal fragment. However, the general proportions of the artefact suggest that only a small piece was fragmented. The object further suggests that tool kits at the time included a variety of burin-like tool components.

The burin-like tool specimen UMB12 is made from spotted grey *killiaq*, characterised by its slender shape, coarsely grained material, and the notable absence of any polish. The artefact was found along the south-facing shore in front of Umiartorfik B. Its morphology is easily associated with the typical burin-like tool, with a trapezoid cross-section and a distinct burin-like tool “edge” (located on the left side, 45% of total length). In the present analysis, it has been classified as a burin-like tool preform, due to its complete lack of polish – highly atypical for a *killiaq* burin-like tool. The shaping of the basal area suggests that the artefacts would have been suitable (or at least prepared) for hafting. The specimen indicates that the procedure of polishing would have occurred in the latest stages of the operational-chain, and that this particular specimen was discarded in a state close to a typologically “finished” tool component.

The preform specimen UMB9 is a large, broad preform of grey *killiaq*. Its material composition is distinctive by its finely grained structure and light grey colour. A portion of its surface is covered with cortex. The working edge makes up approximately 40% of the total length. The dorsal and ventral surface of the specimen feature negative flaking scars characteristic by their relatively large size. The most plausible reason for the discard of the object is the flawed knapping sequence that has occurred along the supposed working edge, where a single large flake has removed a significant portion of the potential edge. Unlike preform specimen UMB12, the technological characteristics (i.e. the remains of cortex and large flaking scars) of preform specimen UMB9 gives an overall impression of belonging to an early preform stage. Although a considerable mass of material is remaining, the artefact would not be subjected to further knapping operations. Again, this returns us to the familiar question of why a person once chose to discard an artefact that by all likelihood would have provided sufficient material for fashioning an object following a presupposed operative scheme. Although the artefact may not have been deemed suitable for immediate use, it was discarded with the knowledge that it could still be picked up again in the future for renewed attempts at making a burin-like tool, i.e. caching. However, the severity of the knapping error may also have been sufficiently discouraging for anyone to consider it a workable preform. Judging by the rare occurrence of similar artefacts in other assemblages, it is conceivable that the Greenlandic Dorset had a high threshold for discarding artefacts in a ‘preform’ stage.

7.4.5. Sideblades (n=14)

Fourteen specimens have been classified as sideblades. Eleven of the specimens were collected within site context, while three were collected from the eroded foreshore. Thirteen were of MCQ, with a single specimen of Nuussuaq *killiaq*. Eight specimens were intact, while the remaining six were fragmented. Five of these were fragmented at the distal edge, while a single specimen has been snapped at its medial section.

7.4.6. Microblades (n=110)

A total of 110 microblades have been identified in the assemblage of Umiartorfik B. The majority of microblades are of quartz crystal (73), while the remaining are of MCQ (36).

Of the 73 quartz crystal specimens, a total of six featured retouch. In comparison, MCQ specimens featured a much higher relative frequency, with 16 out of 36 specimens featuring retouch.

The microblade assemblage featured a considerable variety of dorsal blade faces. Several different steps of Dorset microblade production are thus represented at the site. The majority of microblades, both MCQ and quartz crystal, feature two- or three parallel dorsal surfaces – a total of 66,6% among MCQ specimens and 68,1% among quartz crystal specimens. Five MCQ microblades (13,9%) and twelve quartz crystal specimens (16,4%) featured a dorsal face with remains of cortex. The percentage of microblades with a crested surface between specimens of MCQ and quartz crystal were 11,1% and 6,8% respectively.

A relatively high proportion of quartz crystal microblades have been categorised as irregular (30,1%). The irregular surfaces were primarily due to some degree of cortex or diverging knapping scars (usually from cresting or knapping from several platforms). 16,7% of MCQ specimens were identified as irregular. Regular microblades were most frequent in both raw material groups, with a total of 72,2% regular MCQ specimens and 67,1% quartz crystal specimens. The occurrence of extremely regular microblades was only notable among MCQ specimens (11,1%), while only a single quartz crystal microblade categorised as such, due to its corticated surface (1,4%).

Among the quartz crystal microblades with an intact proximal area, the vast majority featured a combination of a small bulb and lip formation. Platform preparation variants observed included plain (33), facettted (4), and multi-facettted (16). Dorsal front preparation included abrasion

(48) and abrasion/trimming (5). MCQ specimens also generally featured a combined bulb and lip formation. The most frequently observed platform preparation was plain (15), with a total of 3 specimens with multi-faceted platforms. Dorsal front preparation included abrasion (9), abrasion/trimming (8), and trimming (1). Platform-to-front angle were characteristically between 70 to 80° for both raw material groups.

The following types of blade termination were observed among the quartz crystal microblades: ideal (30); feathered (15); and plunged (4). Blade curvature variations included: Straight (6); distal curvature (43); and even curvature (1). MCQ specimens featured the following blade terminations: ideal (9); feathered (8); and hinged (2). Blade curvature variations included: Straight (5) and distal curvature (15).

7.4.7. Microblade cores (n=25)

The assemblages from Umiartorfik B features the largest collection of microblade cores in the present study. A total of 25 specimens were identified. Of these, 21 cores were of quartz crystal and 4 of MCQ. The amount of quartz crystal specimens is unique for Dorset sites in the region and sheds some light on the organisation and use of quartz crystal raw material.

Most quartz crystal specimens featured corticated surfaces, the average amount of surface coverage at ~33%. The amount of remaining cortex indicates the small original size of the quartz crystal nodules. 15 specimens featured a single frontal exploitation. 3 specimens featured double-fronted exploitation, while a single specimen exhibited removals from three distinct fronts. The number of removal scars range from 3 to 11, with an average amount at ~6. As with the amount of remaining cortex, the number of microblade removal scars is considered a result of small nodules of quartz crystal being used as cores.

Hinge fractures were by far the most common final removal observed among quartz crystal microblade cores, with a total of 11 specimens. Three specimens featured a plain platform surface. Seven specimens featured a few, larger platform preparation removal scars. Nine features multi-faceted removal scars on the platform surface.

While most specimens were identified as microblade cores with evidence of successful microblade removals, specimen UMB7 was identified as a preform exhibiting removals related to failed attempts at shaping a microblade core. No cortex remains, as the entire specimen is covered in removal scars of relatively poor quality—hinge fractures in particular. Two relatively large core

fragments, specimen UMB9 and UMB20, were classified as core rejuvenation fragments with distinct microblade core characteristics. Several quartz crystal flakes were also classified as core rejuvenation flakes—some associated by raw material alone, others by distinct technological characteristics related to microblade production (i.e. parallel removal scars).

Specimen UMB19 might be an example of an expedient method of quartz crystal knapping, featuring unidirectional, opposing fronts with a platform based on the original surface of the crystal. One of the fronts features a hinge fracture, while the other appears to have no apparent flaws. These characteristics suggests that the knapper was sufficiently skilled to be able to remedy the knapping error and continue microblade removals on the same core.

The four specimens of MCQ were divided into the following raw material types: dark grey (UMB1), red-brown, red-white (UMB3), and blue-white (UMB25). Specimens UMB3 was originally catalogued as a microblade core, but in the present analysis it was identified as a large rejuvenation fragment. It is also the only MCQ specimen with remains of a corticated surface (~15%). It is not possible to identify the final removal of its last front, but a total of 11 microblade removal scars have been identified on the specimen.

MCQ specimens UMB1 and UMB2 both have microblade removals from two unidirectional fronts and plain platforms. A single fronted exploitation is seen on Specimen UMB25, with a multi-faceted platform. The amount of microblade removal scars identified are as follows: 15 (UMB1); 16 (UMB2); 6 (UMB25). The platform-front angle of the MCQ specimens are approximately ~70 degrees. The MCQ microblade cores have all been completely heat-treated. Specimen UMB1 is severely burned at its distal area. It is not possible to determine if this was the result of heat-treatment or post-depositional exposure to heat.

Microblade core specimen UMB25 is another example of careful utilisation of MCQ for microblade production. Its technological attributes indicate that the core is the final remaining mass of a considerably larger nodule, as seen by the remains of two large parallel removal scars along the back of the core, evidence that numerous knapping operations were subsequently made after the two large microblades were removed. These traits thus demonstrate the great care taken by a knapper to efficiently utilise the potential of this specific core.

7.4.8. Adzes (n=12)

Different types of *killiaq* include grey (7), spotted grey (4), as well as a single specimen of Angissat-*killiaq*. Four specimens were complete, while the following two types of fragmentation were observed: short distal (2) and long distal (6). All except a single specimen exhibit bifacial removals. Only a single specimen feature polish (at around ~40% coverage).

7.4.9. Large flakes/preforms (n=20)

The assemblage of larger flakes and preforms numbered a total of 20 specimens. Numerous specimens exhibited ambiguous characteristics that made any confident type classification impossible. However, judging from qualities such as morphology and the positioning of negative removal scars it was possible to define the flakes and preforms in relation to specific artefact types.

Specimens of MCQ included preforms related to either endscrapers or endblades. The specimens highlight the arbitrariness of the ‘preform’ category. The artefacts exhibit a variety of technological characteristics that opens questions regarding the reason why they were deposited at the site. Indicators of failed attempts at flake removals and poor raw material quality among the specimens suggests why these large flakes/preforms were abandoned. Although by no means verifiable without proper study through use-wear analysis, the question of expediency in tool component use was also raised, with some specimens exhibiting traits that despite being atypical creates a general morpho-typological resemblance to more typical tool components. The safest assertion that can be made from the specimens is that they represent episodes of raw material having been procured and subsequently transported to the site before and/or after being subjected to testing. Specimen UMB4 of grey MCQ is an example of a large, plunged flake on which cresting removals have been made along its edges, possibly as preparation for bifacial pressure-flaking removals.

Six specimens of quartz crystal were classified as being preforms for microblade cores. These specimens are typically intact natural and highly translucent nodules. Two quartz crystal specimens were classified as being the result of microblade core preparation removals, indicated by the diagonal direction of fracture that would have produced a working platform on the microblade core.

The six specimens of *killiaq* include two specimens of the Angissat-*killiaq*, three of the grey Nuussuaq-type, and one of spotted grey. The general morphology of the artefacts suggests

that they would have been possible preforms for the production of *killiaq* endblades, further indicated by polished surfaces seen on specimens UMB19 and UMB20.

7.4.10. Flakes (n=3805)

See part 3.4.3.2.

7.5. Umiartorfik C

7.5.1. Endscrapers (n=1)

A single specimen from Umiartorfik C was classified as an endscraper. The specimen is made from quartz crystal. It is a small (15,2 x 12,8 x 5 mm), long distal specimen with flared edges and an edge angle at about 80°. No similar specimens of quartz crystal have been identified in the other assemblages of the present study.

7.5.2. Microblades (n=36)

The following types of fragmentation among quartz crystal specimens was observed: short distal (1); long proximal (6); short proximal (3); and long distal (5). Of the 10 MCQ specimens, 6 were intact, while observed variants of fragmentation included short proximal (2), long distal (1), and medial (1).

Quartz crystal microblades with an intact distal area featured the following removal terminations: ideal (12); feathered (4); and plunged (1). The observed blade curvatures were dominated by specimens featuring distal curvature (16), with only two specimens classified as straight. MCQ microblades with an intact distal area featured the following removal terminations: ideal (2); feathered (2); and plunged (3). Blade curvature observed among MCQ specimens is dominated by distal curvature, with only a single straight specimen.

The translucent quality of the quartz crystal material made unequivocal classification of specimens difficult, especially when attempting to categorise dorsal surfaces with flaking scars from specimens with a (partly) corticated surface. As with the quartz crystal specimens recovered from area B, a large proportion of microblades from area A featured irregular dorsal surfaces – 9 in total (34,6%). The remaining majority featured 16 specimens with regular surfaces (61,5%), while a single specimen was classified as having an extremely regular dorsal surface (3,8%). The

high frequency of irregular surfaces seen among quartz crystal specimens is here regarded as an indication of the relatively small nodules used for quartz crystal microblade production, rather than poorly executed knapping removals. The following dorsal surfaces were identified among the quartz crystal microblades: full cortex (2); two dorsal surfaces, one negative scar and one with cortex (2); two dorsal negative scars (9); three dorsal negative scars (12); and four negative dorsal scars (1). In general, the microblade specimens featured small platforms, small bulb and lip formations, no bulbar scar, and a platform-to-front angle at approximately 70 to 80°. Platform preparations observed on quartz crystal specimens is dominated by plain platforms (14). Facetted (1) and multi-facetted (4) were also observed.

7.5.3. Microblade cores (n=6)

Platform preparations among MCQ specimens were also dominated by plain platforms (4). Two specimens featured facetted and multi-facetted preparations respectively. Five specimens featured removal scars on a single front, while a single specimen of quartz crystal (Specimen UMC1) featured a two parallel removal fronts. The latter specimen numbers a total of eight removal scars between both fronts.

The negative removal scars on among the cores exhibit several different final blade terminations. Two quartz crystal specimens feature an ‘ideal’ final removal. The final removal of one quartz crystal specimen as well as the MCQ specimen is a hinge fracture. A single quartz crystal specimen features a feathered termination. The quartz crystal core fragment did not exhibit any visible indicators of final front termination.

The MCQ core and a single quartz crystal core featured plain platform preparations. The remaining specimens (except the core fragment) exhibited multiple platform removal scars. The platform-to-front angle observed among the specimens were exclusively ~90°.

7.5.4. Flakes (n=1353)

See part 3.4.3.3.

Appendix B - Lithic assemblages from Northernmost Greenland

8.1. Engnæs

8.1.1. Endblades (n=6)

Six specimens were identified as bifacially knapped endblades. All the specimens have been made from MCQ, including blue-grey (4), grey (1), and light grey (1) variants. Three variations of fragmentation were identified: Long distal (1), short distal (2), and short proximal (3). None of the distal and proximal fragments were possible to refit. Only the distal specimens were able to indicate the original morphology of the endblade components. Specimen L1.9408 (l: 44,7; w: 33,2; t: 5,4 mm) was categorised as a long distal fragment of a rectangular-oval endblade component—fragmented just above the proximal base. The two short distal specimens were tentatively categorised as triangular (L1. 9405) and triangular-oval (L1.9451) respectively. All the endblade fragments have been bifacially knapped.

Most short proximal fragments suggests that the deposition of endblades at the site was the result of activities related to the replacement of components. Furthermore, the fragments share a common characteristic that is the diagonal line of fracture that fragmented the original endblade. This is seen as a recurring trait among endblade artefacts from northernmost Greenland. Traces of wear along the area of fragmentation on specimen L1. 9485 might suggest that it was subsequently used as a strike-a-light after fragmentation.

8.1.2. Endscraper (n=1)

A single endscraper specimen was identified in the assemblage from Engnæs. Specimen L1.9450 (l: 26,2; w: 24,6; t: 6,8 mm) is a complete endscraper made from blue-grey MCQ that has been bifacially knapped from a flake. The proximal end of the specimen features the original flake platform that suggests that the flake was struck from a nodule with corticated surface. Its ventral surface exhibits numerous removals from several directions, although an emphasis is seen around proximal area to remove the bulb of percussion, as well as along the steeply angled flaring notches along both sides. The base of the artefact underneath the side notches is of a rounded morphology.

The endscraper specimen identified in the site assemblage from Engnæs is highly typical to the region in regard to raw material as well as typological and technological characteristics. During examination of the specimen, the notably asymmetrical positioning of the notches—common among specimens identified in the regional analysis—prompted considerations on the purpose of such a design. Furthermore, the distinctly rounded shape of the right notch (as seen from the dorsal front) is notable. From these two observations, the idea emerged that the design of the component may have had a different purpose than strictly for hafting.

8.1.3. Microblades (n=12)

Twelve specimens were identified as microblades in the Engnæs assemblage. Eight specimens have been knapped from blue-grey MCQ, two from a brown-grey variant, and one specimen from light brown and light grey respectively. Six of the microblades feature traces of edge shaping by retouch. The type of fragmentation is varied among the specimens, featuring complete (3), long proximal (3), long distal (4), and medial (2) fragments. A specimen that might indicate in situ knapping of microblades is specimen L1.9442 (l: 33,5; w: 8,7; t: 2,6 mm), which features irregular removal scars along the right dorsal side that are either the remains of preceding front preparation removals or the irregular surface of the lateral side of the microblade core. In any case, the removal would indubitably have provided a more favourable surface for subsequent microblade removals.

8.1.4. Adze (n=1)

A single adze (L1. 9409) was identified in the Engnæs assemblage. Compared to the general technological typology of the Greenlandic Dorset, it is a highly generic adze component made from black dolerite. The bulb of percussion and ripples on the ventral surface suggests that its preform-stage was that of a considerable dolerite flake. Flaking removals have predominantly occurred on its dorsal surface, with only a moderate amount of removals made towards the ventral surface. Considering the positions of the ventral removals which exhibits an emphasis on the proximal and medial areas of the specimen, it is likely that the original shape of the preform favoured the preferred morphology of an adze component. It is among the larger adze specimens identified in the assemblages included in the present study, measuring l: 120; w: 61,5; 14,5 mm.

None of the three dolerite flakes in the assemblage could be refitted with the specimen, indicating that another dolerite object (here assumed to be another adze component) was at some

point produced or rejuvenated at the site. The technological characteristics and measurements are evident of the specimen originally being a large flake from a considerably large dolerite nodule.

8.1.5. Large flakes/preforms (n=2)

Two specimens were identified as large flakes/nodules shaped as preforms for tool production, both of blue-grey MCQ mostly covered by cortex. One complete specimen (L1.9406) has been refitted from two fragments. This specimen features a flat corticated surface on either side, which makes it impossible to distinguish between a dorsal or ventral surface. It has predominantly been unifacially knapped, although a series of steep removals have been made towards the lichen covered surface. The positioning of the flaking scars, especially the removals along its front edge, strongly suggests that the artefact is the preform of an endblade.

The distribution of removals has shaped the artefacts towards the typical diagonal rectangular morphology commonly seen among endblades in the regional analysis. The knapping operations appears to have been concluded with the fragmentation of the nodule. On close examination of the fracture properties of the fragmentation it becomes clear that the accident happened due to a deep removal into what would seem to have been a fragile area of the nodule. Judging from the general morphology of the preform and the distribution of removals, one can assume that the deeper removals were supposed to initiate the shaping of a hafting base.

8.1.6. Flakes (n=274)

Refitting of flakes was attempted, and four successful refits were achieved. The refitted flakes were of blue-grey MCQ and were all covered with cortex. No distinct technological traits were able to associate the specimens with any specific category of tools, but the flake size and cortex suggests that they were detached from a large corticated nodule. The flakes of dolerite were all refitted together.

8.2 Vandfaldsnæs

8.2.1. Endblades (n=7)

Seven endblades were examined. Each is fragmented, including short proximal fragments (3), long distal fragments (3), and long proximal fragment (1). The blue-grey and light brown specimens feature the distinctive diagonal fragmentation of the proximal area seen among endblades from Northern Greenland. While most specimens are fragmented just above the proximal base, specimen L1.7650 has been fragmented within the proximal base. Although fragmentation in this area is commonly seen in assemblages from the region, it should be worth considering the possibility that the fragment was originally attached to a similar yet different lithic tool component, such as a burin-like tool. This is based on the design similarities observed among the included site assemblages, and the fact that the two tool types are here made from similar raw material, unlike in Disko Bay.

The morphology of the distal specimens was observed as either triangular oval (2) or rectangular-oval (2).

The specimens with a remaining proximal area all feature basal fluting. A single specimen has been unifacially knapped. This specimen has previously been classified as a sidescraper by Sørensen (2012). However, the definition of the specimen as a sidescraper is here considered highly tentative. The only technological characteristics of the specimen that might correspond with the more distinct sidescraper-type known from the Dorset are knapping removals made bilaterally along the dorsal surface. No comparable specimens have been identified among other assemblages featuring varieties of sidescraper specimens. Considering that atypical endblade specimens do occur in Dorset assemblages (see chapter 3), however, the specimen is here defined as an atypical endblade component—likely for a knife tool.

8.2.2. Endscrapers (n=9)

The nine endscraper specimens are all made from blue-grey MCQ. Three specimens have been bifacially knapped, while a single specimen features a ventral surface without removals. The bifacially knapped specimens all feature ventral removals on the basal area, suggesting shaping for hafting.

Endscraper specimen L1.7616 is unique due to its relatively high amount of cortex (~20% total surface coverage). The scraper component has been made from a thick flake with a corticated

dorsal surface. Its right dorsal side is a flat corticated surface suggestive of the generic tabular morphology of regional MCQ nodules. The most distinctive characteristic of the specimen is series of removals made on the right ventral side. Although removals have been made along the entire side, it is the distinct notch towards the distal front working edge that is most conspicuous. A closely set series of high-angled removals have been made into a neatly curved notch that provides the generic flared scraper edge. However, the removals towards the proximal part of the ventral surface has created a second flaring. This begs the question of the intended purpose of such removals. While the lack of deliberate removals on the opposing side may indicate that removals were not necessary (i.e. the general morphology of the component was adequate for fitting it into a composite tool), the contrast is striking. Furthermore, the angle of the notch removals is consistently steep, similar to the removals of the front edge.

8.2.3. Sidescraper (n=1)

A single artefact was tentatively classified as a sidescraper. The specimen, collected from feature 9a, is made from black MCQ and has a crude and steeply angled crescent edge. The morphology of the artefact can only be vaguely associated with the ‘typical’ Greenlandic Dorset sidescraper, seen in assemblages from northeastern and western Greenland.

8.2.4. Burin-like tools (n=4)

The assemblage from Vandfaldsnæs features four specimens identified as burin-like tools. The burin-like tools have been made from black (2) and grey (2) MCQ. The specimens of black MCQ include an intact specimen (L1.7623) and a long proximal fragment (L1.7624). Specimen L1.7631 and L1.6505 of grey MCQ is a long distal and short proximal fragment respectively. Specimen L1.7624 and L1.6505 both feature a fluted proximal base. Working edges are all located on the left dorsal side.

Specimen L1.7623 is the most distinct burin-like tool specimen identified among the regional assemblages. Its basal area is notably asymmetrical, with only the left dorsal side notched. This design could indicate that the component was once hafted in a similar way to burin-like tool components seen from preserved composite tools from the Late Dorset, where it is inserted into a deep groove so that only the area with a lateral working edge is exposed. Polish is featured across most of its distal area, but a significant coverage of lichen makes it impossible to assess the degree

of polish. The moderately polished working edge makes up most of the left dorsal side of the specimen. The degree of polish could indicate that the specimen was deposited in an early stage of tool usage. However, the degree of working edge polish on BLT specimens of MCQ could also be attributed to the properties of the raw material. This possibility is discussed in the final part of the chapter.

Specimen L1.7624 has been defined primarily by its ventral surface polish and the design of the left dorsal working edge (without polish). Besides these traits, the design of its proximal area is highly resemblant to that of endblades in regional Dorset assemblages (e.g. endblade specimen L1.9728 from Kap Mylius-Erichsen, part x). In the specific context of the Greenlandic Dorset period in northernmost Greenland it is conceivable that such high degree of design similarity could be the result of connected temporalities of the groups visiting the region.

The proximal fragment, specimen L1.6505, yielded the fewest attributing characteristics of the three defined burin-like tools. However, small yet distinct polished surface can be observed at its left dorsal side. The remaining edge and the morphology of the proximal base indicates the general morphology of the original intact burin-like tool. This morphology would have featured asymmetrically angled lateral edges with the lowest angle along the working edge. Such a morphological trait has been observed among specimens of both endblades and burin-like tools, which also adds to the tentative definition of proximal fragments of either category.

8.2.5. Microblades (n=20)

20 specimens from the Vandfaldsnæs assemblage were classified as MCQ microblades. The raw material variations included blue-grey (7), grey (8), and light-grey (5). The raw material variation at Vandfaldsnæs suggests that only regionally available raw material was produced and discarded at the site. Most specimens were complete (11), while the various types of fragmentation included short distal (1); long proximal (2); short proximal (1); long distal (3); and medial (2).

The microblades were collected from four of the site features distinguished by Knuth. A single specimen was collected at Feature 9, while four were collected from Feature 9a. These five specimens were all made from similar grey/light grey MCQ. At Feature 10, two specimens were collected – one microblade knife of blue-grey and the other a standard microblade of grey MCQ. A total of 13 specimens were collected from Feature 11, with 7 specimens being of grey/light grey MCQ and 6 of blue-grey MCQ.

Most specimens were classified as typical microblades (11), while the remaining were classified as microblade knives (4), microblade preparation blade (2), and a combination of microblade knife and preparation blade (3 specimens featuring both lateral retouch as well as a crested dorsal surface).

The following dorsal surfaces were identified: two surfaces with a negative removal scar, one corticated (1); two surfaces with negative removal scar (7); three surfaces with a negative removal scar (9); four surfaces with a negative removal scar (1); and laterally crested surfaces (2). Between the specimens, 4 were classified as having an irregular dorsal surface, 15 with a regular surface, and a single specimen with an extremely regular surface. The specimens generally featured small and smooth platform surfaces, together with the typical occurrence of a bulb and lip combined. Specimens with a distal area feature typical distal curvature, apart from a few specimens that have a feathered distal termination.

8.2.6. Microblade core (n=1)

See part 4.4.2.

8.2.7. Adze (n=1)

A single adze specimen split into two fragments (L1. 7634a-b), was identified in the assemblage. It is a large specimen, 115 mm in length and 47 mm in width, with a series of crude removal scars. A small amount of polish was identified, which appears to be the result of erosion from exposure rather than use. Although their spatial relationship can only be guessed, the different exposure to erosive forces is evident when the fragments are refitted. The polish along the side of fragment A does not follow over to specimen B, indicating a different state of post-depositional exposure.

8.2.8. Flakes (n=165)

A total of 165 flakes, both complete and fragmented, were identified in the site assemblage. The raw material composition is homogenous, dominated by blue-grey/grey MCQ flakes. Blue-grey/grey specimens were collected from features 11/11b and 10. The six specimens collected at feature 10 were relatively large flakes, suggesting a short, distinct episode of knapping having occurred here. The only specimens of black MCQ were three large flakes collected from feature

11, as well as a burin spall collected from feature 9a. 61 dolerite flakes were identified, most of which were collected from feature 11 and 11b (see part x).

8.3. Kap Harald Moltke

8.3.1. Endblade (n=1)

A small, fragmented specimen of blue-grey MCQ in the collection from Kap Harald Moltke has in the present study been tentatively classified as the fragment of an endblade. The specimen features traces of bifacial knapping together with a diagonal fragmentation fracture suggests that it has been the proximal extremity of a fluted endblade base. These characteristics are critical for the present association of the artefact to the Dorset endblade technology instead of Independence I burin technology. As has been observed in several assemblage from the region, both distal and proximal fragments of endblades have been diagonally fragmented at the base of the original lithic endblade.

8.3.2. Endscraper (n=2)

Specimen L1.9831 is among the smallest endscraper components identified among the assemblages in the regional study (l: 18; w: 23,6; t: 5,7 mm). The specimen has been unifacially knapped (discounting the notch removals). The ventral surface indicates the original preform state of the specimen as a small but thick flake. Its 'stunted' morphology could be due to numerous episodes of rejuvenation occurring while the component was attached to a haft.

Unlike specimen L1.9831, the remaining mass and size of L1.7462 suggests that it was subjected to no or limited rejuvenation. Its technological attributes are defined by unifacial knapping removals, a low edge angle, flared edges, and basal fluting.

8.3.3. Sideblade (n=1)

The specimen is made from brown-grey MCQ, and is a fragment measuring l: 30,5; w: 13,5; t: 2,4 mm.

8.3.4. Microblade (n=1)

Only a single microblade specimen was tentatively identified in the collection from Kap Harald Moltke. The specimen has been knapped from a light brown type of MCQ and does not match the

raw material types of the microblade cores in the collection. The specimen is intact except a small fragmentation at the lower left distal corner. The platform is large with two facets from preparation, and its platform front has been prepared by abrasion. Its dorsal surface exhibits irregular removal scars, which together with the trapezoid distal morphology suggests that the specimen was a preparation blade. However, it is also considered possible that the specimen could have been made during knapping by pressure-technique of a larger tool component (i.e. an endblade).

8.3.5. Microblade cores (n=3)

The cultural provenance of Specimen L1.9840 can be questioned. Highly similar microblade cores have been collected from Independence I sites in the region. The fact that no microblades of black MCQ have been identified in the assemblages from the region suggests that microblades of this variant were not transported or produced by the people that visited the area, although such specimens could be present in other assemblages not included in the present study (or have yet to be excavated). Nonetheless, it opens the possibility that the core was indeed never subjected to knapping procedures while it circulated in the region. Furthermore, the few findings of flake material from Kap Harald Moltke suggests that the core was not prepared on-site. Even when taking into consideration the lack of sieving during excavation, the removal scars on the microblade core are sufficiently large that the detached flakes would likely have been identified during sieving or surface collection. This points to an event where a person or group transported a microblade core prepared elsewhere and eventually deposited it at the site without further reduction. When taking the proximity to Independence I features and the distinct similarities between cores collected from both Greenlandic Dorset and Independence I sites, research should seriously consider the potential extent to which Pre-Inuit assemblages in the region are mixed.

8.3.6. Large flakes/preforms (n=4)

Four lithic artefacts in the site assemblage were categorised as large flakes/preforms. Their measurements range from c. 33 to 92 mm in length, c. 26 to 67 mm in width, and c. 10 to 22 mm in thickness. The generally large size of the flakes is typical for preforms identified in the assemblages from Northernmost Greenland. Their technological characteristics indicate the initial stages of lithic tool production, possibly a result of on-site testing the raw material. The presence

of such large flakes could be further indication of caching, as was suggested for the microblade cores.

8.3.7. Flakes (n=1)

Only a single flake specimen was identified in the collection from Kap Harald Moltke. The raw material is of light grey MCQ. Its large size (l: 15,8; w: 8,5; t: 2,8 mm), which suggests that it was a preform preparation flake.

8.4. Kap Mylius-Erichsen

8.4.1. Endblades (n=3)

Three lithic endblade specimens of MCQ were identified in the assemblage from Kap Mylius-Erichsen. The MCQ types include black (1), blue-grey (1), and green (1). The specimens were classified as long distal (1), short proximal (1), and long proximal (1). The blue-grey, long distal specimen (L1. 9732) also features the typical diagonal fragmentation of the proximal base. Furthermore, it features a distinct removal at its tip, possibly the result of impact fracture (Sørensen 2012:202).

A single specimen, L1.9732, has been made from the common blue-grey/grey type MCQ, both collected from site feature 5. The specimen has been diagonally fragmented in the proximal area. Its distal area has also been fragmented by what appears to be possible impact fracture. The two types of fragmentation raise the question of why it was discarded, as a broken distal area could be considered a valid reason. On the other hand, the specimen also exhibits the diagonal fragmentation so commonly observed in assemblages from the region. A possibility is that either of the fragmentations is a result of taphonomic factors, such as trampling. A more speculative possibility that could be entertained is that the proximal fragmentation occurred when it was removed from its hafting, where a person would have broken the component off sideways out of its socket.

The largest specimen in the assemblage of endblades, L1.9728, has been made from a black type of MCQ. It is yet another endblade featuring diagonal fragmentation—but at its distal area. The specimen was collected from feature 6.

The green, short proximal specimen (L1. 9616) collected from feature 1a is unique among all the collections in the regional analysis. The raw material was described as jaspis by Knuth, but it is highly similar to MCQ. No other artefacts included in the present study have previously been classified as jaspis - a material that has never been mentioned as a locally or regionally available. As a green type of MCQ, the specimen raises questions concerning the circulation of components through the northernmost regions of Greenland, as well as the regional availability of different raw material types.

8.4.2. Endscrapers (n=2)

Two endscrapers were identified in the Kap Mylius-Erichsen assemblage. One specimen has been made from blue-grey MCQ, while the other is a rare specimen of quartzite-like material. The MCQ specimen (L1. 9734) was collected from feature 5, and features a single flared edge, a rounded proximal base, a c. 80° frontal edge angle. and measures l: 23; w: 20 mm.

The quartzite-like scraper, also collected from Feature 5, has an intact large and plain flake platform. It features bifacial lateral removals and has a tapered proximal base with fluting. It is a relatively small specimen, measuring l: 11,5; w:12,5 mm. Its front edge angle is atypically at a low angle at ~60°.

8.4.3. Sideblade (n=1)

A bifacially knapped component, specimen L1. 9733, was initially categorised as an endblade of light grey MCQ with a small diagonal fragmentation at its base. During the process of drawing the artefact, its technological characteristics were seen to be more like that of a sideblade. Thus, the artefact has been categorised as a sideblade with an oval, crescent morphology. The sideblade has been carefully shaped, albeit with a minor error resulting in a small, distinct notch. The lateral area with the notch is considered the area where the component was inserted into the groove of the cloven-hoof lance.

8.4.4. Microblades (n=11)

The microblades were collected from Feature 1a (L1.9606), Feature 4 (L1.9611), Feature 5 (L1.9737, 9738), Feature 6 (L1.9612, 9613, 9615, 10454), and Feature 7 (L1.8252, 8253, 8254). The specimens were made from three types of MCQ: light grey (4), blue-grey (5), and dark brown

(2). Nine specimens were classified as typical microblades without retouch, while two retouched specimens were classified as microblade knives.

Most of the specimens were classified as complete (6). The various types of fragmentation identified in the remaining specimens include short distal (1), long proximal (3), and long distal (1). Specimens with a retained distal area generally featured the ‘ideal’ distal curvature. A single specimen featured a feathered distal termination, while another individual specimen featured a plunged termination.

The following dorsal surfaces were identified: two surfaces with a negative removal scar (1); three surfaces with a negative removal scar (8); four surfaces with a negative removal scar (1); and laterally crested surfaces (1). Eight of the specimens were classified as having a regular dorsal surface, two with an extremely regular dorsal surface, and a single with an irregular dorsal surface. Most specimens featured a dorsal front preparation with trimming and abrasion. The ventral surfaces of the specimens featured no visible rippling. The specimens also featured small bulbs with a lip, along with small and smooth platforms. The technological traits of the specimens correspond well with the typical Greenlandic Dorset methods and techniques for microblade production.

Previous analyses of the Kap Mylius-Erichsen collection yielded a refit between specimen L1. 9613 from feature 6 and L1.9738 from Feature 5, suggesting some degree of contemporaneity between the two features (Owen 1983). The refitted specimens are the only ones from the collection knapped from a dark brown MCQ variant, both classified as unretouched microblades. Attempts at refitting the remaining microblades in the collection was made, but no other refits were achieved. Considering the small size of the microblade collection, the lack of refits among specimens with such distinct raw material homogeneity could potentially indicate patterns of microblade production and utilisation. The fragmented specimens are in this regard interpreted as the probable discard after tool component replacement. Why the complete specimens were discarded, on the other hand, is more difficult to interpret. One possibility is that they are the result of knapping where the microblades that were considered suitable for use were utilised and later transported away from the site. Besides the refitted specimens, the strongest evidence for *in situ* production of microblades is specimen L1.9606 with its crested dorsal surface, although it is the only microblade specimen from the feature it was collected (1a). The three types of raw material identified also indicate the presence of three different nodules/cores utilised for production. If the site features

were made and used contemporarily, the distribution of microblades across these would suggest that several individuals were simultaneously engaged in microblade production.

8.5. Hvalterraserne

8.5.1. Endblades (n=1)

A single long distal fragment of a bifacially knapped endblade was also identified in the assemblage from Hvalterraserne (fig. x). The specimen, L1. 10137, has a large rectangular morphology, measuring l: 61; w: 38; t: 6,5 mm. At the area of fragmentation, it is possible to see two small, rounded corners. In accordance to the typical morphology and technological traits of bifacially knapped endblades from northernmost Greenland, these features suggest that the artefact was fragmented right above the hafting base, as is commonly observed in the site assemblages from the region. The specimen was not produced on site, but rather transported to the site in a fragmented state or fragmented at the site, indicating that tool kit maintenance occurred here.

8.5.2. Microblades (n=3)

Three microblade knives were identified in the assemblage from Hvalterraserne. Two specimens are of blue-grey MCQ, one complete and the other a short proximal fragment. The third specimen is of a brown type and is complete. All three microblades feature retouch or possible traces of use wear and have thus been categorised as microblade knives. Two specimens feature dorsal surfaces with parallel negative removal scars, while a single specimen features three parallel negative scars—the two former classified as regular and the latter as extremely regular. The two complete specimens both exhibit ‘ideal’ removal terminations. A single specimen features distal curvature, while another is straight. Between the two complete specimens, one features a bulb with lip formation while the other features only a lip formation. The platform-to-front angles are ca. 70–80°, with a one specimen exhibiting a platform front preparation with trimming and abrasion, and the other with abrasion exclusively.

While their technological characteristics offer little else than generic traits associated with Greenlandic Dorset microblade technology, the raw material type and spatial distribution of one of the specimens was notable. The brown specimen (L1. 10125) was found in a 60x100 cm flagstone-paved compartment in the rear section of mid-passage feature A. Its colour distinguishes it from

the blue-grey and black MCQ available in the surrounding area and region, and it has thus been interpreted as an exotic item (Grønnow and Jensen 2003:225). Indeed, the apparent caching of this specimen emphasises its conspicuous presence at the site. One can only speculate the significance of its deposition. Nonetheless, the find context of the artefact calls for attention towards caching practices during the Greenlandic Dorset.

8.5.3. Large flakes/preforms (n=12)

In the inventory of Knuths catalogued artefacts from the site assemblage of Hvalterraserne, Jens Fog Jensen lists a total of 12 preforms or large flakes. In the present analysis, these twelve specimens included eight artefacts categorised as preforms, and four as large flakes.

Among the most notable specimens is a large wedge-like artefact: Specimen L1.10141. It is among the few artefacts categorised as large flakes/preforms that exhibit characteristics that may potentially be associated with a diagnostic tool component type. The artefact is a large object (l: 89; w: 48,3; t: 14,2 mm) of high-quality blue-grey MCQ that has been carefully shaped into a wedge/adze-like morphology. Considering the immediate availability of lithic material in the area, it is conceivable that the original tabular shaped nodule was collected nearby by a person that subsequently decided to remove flakes in order to shape the nodule into a generic preform or possibly an adze component.

Only specimen L1. 10142 can technically be categorised as a large flake. It features large dorsal removal scars indicative of earlier flake detachments. Removals made after the flake was detached are mostly edge removals presumably as platform preparations. The ventral bulb of percussion has also been deliberately removed by several flaking removals. Considering its substantial size, the flake appears to have been removed from a particularly large nodule.

8.6. Kap Holbæk

8.6.1. Endblades (n=8)

Eight endblades were identified in the present analysis of the Kap Holbæk site assemblage. The specimens were collected from Group II (b, c, d) and III (a). Although their fragmentation inhibited confident assessment of endblade morphologies, three types were tentatively defined: Oval (1); rectangular-oval (2); and triangular-oval (2).

During the examination of the Kap Holbæk site assemblage, two distinct endblade specimens were unfortunately found missing. Both specimens are prominently featured as regional type specimens for regional Dorset endblades in (Sørensen 2012), and were also noted and illustrated by Knuth himself during fieldwork at Kap Holbæk (Grønnow and Jensen 2003:26). While a direct examination has not been possible, available artefact drawings of the objects are highly indicative of their technological characteristics. Both specimens are symmetrically shaped, with the larger specimen exhibiting a triangular-oval morphology while the smaller is more distinctly triangular. The design of their side-notched proximal bases is slightly different, with the larger specimen featuring markedly rounded notches and the smaller with a more rectangularly shaped base with less rounded notches. The smaller specimen also exhibits the typical diagonal fragmentation at its proximal end. It is clear that the two finished components were replaced during tool maintenance.

The single endblade specimen collected from 2 B is another example of endblade production from small natural flakes of MCQ. The specimen has been made from a thin nodule of coarse quartzite-like MCQ. It has a large, oval morphology (measuring l: 52,7; w: 34,5; t: 5,15 mm), with possible traces of fragmentation at the proximal area suggesting that a proximal base has been broken off. It features only limited amount of surface and edge removals on either side leaving a considerable corticated surface coverage remaining. Such traits suggest a high level of expediency in the selection of raw material—a trait more consistent to the endblade of western Greenland. In his examination of the Kap Holbæk assemblage, the specimen was categorised as an endblade preform by Sørensen (2012:241). The present examination contradicts this definition. The short edge removals are a result of accommodating to the thin, flat cross-section of the original MCQ flake, rather than signifying a preform state. Considering the possible proximal fragmentation of the specimen, the present analysis defines it as a fragmented endblade shaped from an expediently procured flake. The specimen suggests events of highly expedient raw material procurement and production.

Feature IIb

A single long distal specimen, L1.6953, of light brown MCQ w/o heat treatment was recorded from feature IIb. The specimen is described in part 4.4.6. Another endblade fragment was tentatively

identified in the collection of flake material from Feature IIb. It is classified as a possible short distal fragment made from black MCQ.

Feature IIc

A single short distal specimen of white MCQ was collected from Feature IIc. The glossy surface of the raw material suggests possible heat treatment. The specimen has been bifacially knapped, and its morphology resembles that of the rectangular-oval type despite its fragmented state.

Feature IId

A total of five individual endblade specimens were identified in assemblage collected from Feature IId. Exclusively made from MCQ, the following MCQ types were identified: white (1); grey (1); banded grey (1); light grey (1); and light brown. The specimens were all fragments: short distal (2); long distal (1); and short proximal (2). The specimens have all been bifacially knapped.

8.6.2. Sideblades (n=9)

See part 4.4.6.

8.6.3. Endscraper (n=1)

The assemblage also includes a single endscraper. The specimen has been made from a distinct brown type of MCQ. The specimen is characteristic by its lack of lateral removals. By Knuths own observation, the specimen is classified as fragmented. The present analysis supports this observation, as a considerable mass of the distal area appears to have been detached from the original ventral surface, leaving a distinct removal surface at its proximal area. While at first glance the specimen would seem intact, the traits of the ventral and proximal area cannot be ascertained as those of an original end scraper component.

8.6.4. Burin-like tool (n=1)

See part 4.4.6.

8.6.5. Microblades (n=26)

A total of 26 microblades were identified in the present analysis. 24 specimens were collected from Feature IIa (9), IIc (1), and IId (14). A single specimen (L1.7005) was collected from Feature III, and another single specimen (L1.6810) was collected from an undisclosed location at the site. The raw material composition of the artefacts is distinct to each of the different features.

Feature IIa

Most specimens collected from Feature IIa were identified as grey MCQ, while raw material type identification of two specimens were not possible due to lichen coverage. The specimens have all been categorised as standard microblades. Most dorsal surfaces feature three parallel removal scars (5), with two specimens featuring two parallel scars and a single specimen with four parallel scars. A single specimen (L1.6945) feature two parallel negative scars alongside a surface with preparation removals, suggesting that the removal was made shortly after microblade core surface preparation. A recurring trait among the specimens is a diagonal distal edge, suggestive of a similar microblade core preparation method as seen on core specimens from the region (see part x). The two specimens of an unidentified raw material type (due to patination), L1.6951 and L1.6947—a long distal and medial fragment respectively—were refitted.

Characteristics such as platform morphology- and preparation, bulb morphology, and blade front preparation were typical, generally featuring small, plain platforms, a bulb with lip formation, and a platform-to-front preparation by abrasion or combined abrasion/trimming. Removal angle, however, were identified as generally steeper (between 80-90°) than seen on specimens from the other features at Kap Holbæk. Considering the slightly varying morphology of Dorset microblade cores observed between different assemblages in the present study, a steep removal angle might suggest that the blades were detached from the highly homogenous types of cores that are characterised by their steep removal fronts (see part x Kap Harald Moltke).

Feature IIc

A single microblade specimen was documented as collected from feature IIc. The raw material type of the specimen was identified as light grey. The specimen (measuring l: 30,2 w: 6 t: 1,7 mm) is classified as a microblade preparation blade, due to the dorsal surface featuring two parallel negative scars and a surface with cresting removals for preparation. It features a distal curvature and an ideal removal termination. The remaining characteristics are typical, with a small bulb and

lip formation and a small platform, as well as a removal angle at ca. 70-80°. The front preparation features traces of trimming removals and abrasion.

Feature IId

All except one burnt specimen from Feature IId were identified to be of a white MCQ material. Two specimens were identified as microblade knives, a single as a microblade preparation removal, and the remaining as standard microblades w/o retouch. None of the specimens were intact. The following types of fragmentation was observed: Short distal (3); long proximal (6); long distal (1); and medial (4). Several fragments were refitted into complete microblades. The three refitted specimens include the following: L1.6980 (refitted with L1.6810, collected at another unspecified feature); L1.6979 with L1.6988; and L1.6990 with L1.6982.

The majority of microblade specimens from Feature IId featured a dorsal surface with three parallel negative removal scars (7). Other types of dorsal blade surfaces include two parallel removal scars (2); two parallel removal scars and one corticated surface; four parallel removal scars (1); two parallel removal scars and one crested surface (1). All except the specimen featuring an irregular cresting surface were identified as having regular dorsal surfaces. The ventral surfaces of the microblades were all identified as smooth. Five specimens allowed identification of blade termination, all of which featured ideal removal terminations. Identified types of blade curvature include distal curvature (4), and straight (1). Technological characteristics such as platform morphology- and preparation, bulb morphology, removal angle, and blade front preparation were typical of the Dorset pressure-flake microblade technology. As such, the microblades generally featured small, plain platforms, a removal angle at ca. 70-80° a bulb with lip formation, and a platform-to-front preparation by abrasion or combined abrasion/trimming.

8.6.6. Adzes (n=3)

The three identified dolerite adze specimens in the site assemblage were crudely knapped, exhibiting removals of irregular size and quality along with a high degree of corticated surface coverage. Specimen L1.6952—collected at feature II A—exhibits a minimal amount of distal edge polish. Although categorised as ‘finished’ adze components, the two remaining adze specimens could possibly be preforms based on the large amount of cortex. However, their general size and morphology is consistent with typical Greenlandic Dorset dolerite adzes. Furthermore, their

characteristically expedient shaping is also typical for adzes found in the region. The two specimens were collected from the lithic ‘workshop area’ northeast of feature II C. The third adze from this area was not identified in the site assemblage.

8.6.7. Large flakes/preforms (n=2)

The specimen previously defined as a microblade core by Sørensen was identified in the present analysis (L1.6954b) and has only been tentatively defined as a generic preform. It is made from a coarse, grey-white type of MCQ. Its general morphology is indeed resemblant of larger Dorset microblade cores but exhibits few—if any—technological characteristics attributable to microblade cores. The only possibly distinct trait is a single, irregularly shaped removal scar where a typical core front would be.

8.6.8. Flake material (n=629)

See part 4.4.6.

Appendix C - Lithic assemblages from Kap Skt. Jacques, Île de France

9.1. Feature 101

9.1.1. Endblades (n=19)

Two endblades made from quartz crystal were intact. The following types of fragmentation were observed among the remaining specimens: Short proximal (2), and long distal (5). The three MCQ specimens include a single intact endblade, one short proximal, and one long distal. The quartzite specimens include three intact specimens, one long distal, and one long proximal endblade. The *killiaq* endblade is classified as a long proximal specimen.

Sorted by general morphology, the following types were identified: Triangular (3); triangular-oval (9); and rectangular-oval (2). The assemblage features several specimens that are characteristic by their design and technological attributes, indicating production, use and maintenance of endblade lithic components.

An example of a small bifacially knapped endblade that has been subjected to rejuvenation is Specimen x81, made from grey quartzite. Events of rejuvenation are indicated by the proportionally large side-notched proximal base and the small distal area that features minute removal scars. The distal area makes up an asymmetrical triangular-oval morphology, while the proximal area exhibits a morphology resemblant of a fish's tail. Most of its removals, pronouncedly at the proximal notches, are steep edge removals. With only a few removals intruding into the centre of the artefact, the specimen was finished with a thick cross-section. This can best be explained by the assumed difficulty of pressure-flaking hard and coarse quartzite material. Thus, the morphology of x81 was highly influenced by the properties of the raw material used for production.

In terms of design, among the most unique endblades identified in the regional assemblage analysis is Specimen x85— a small, intact endblade made from quartz crystal (l: 26,3; w: 14,3; t: 3,7 mm). Its distinct shape is defined by a narrow side-notched proximal base, and a relatively wide and triangular distal area, creating a morphology resembling that of harpoon-points. While Specimen x85 can arguably be considered an atypical endblade—both empirically and by

Sørensen's technological typology—we can speculate how the component design afforded to raw material properties and composite tool relations. The narrow proximal base is evidence that the specimen was hafted into a small composite tool. The unusually small size and its relatively symmetrical triangular shape makes it conceivable that it may not have been used as a knife, but rather as armature for a lance or a harpoon. Another explanation for its size can be derived from the technological attributes indicating its preform stage. The morphology of its proximal end and its thin profile indicates that the endblade was shaped from a small flake removal.

Specimen x96 has previously been catalogued as a sideblade. Upon re-examination, however, the specimen features traits highly resemblant of a long distal fragment from a rectangular-oval endblade—similar in design to the types commonly observed among the assemblages from Peary Land (Chapter 4). No associated fragment was identified in the available assemblage.

Specimen x77 is made from a unique type of raw material, highly resemblant of killiaq. Such an example of a bifacially pressure-flaked endblade of silicified slate has not been observed in other assemblages of the Greenlandic Dorset. The specimen is a long proximal fragment, with its distal end absent in the assemblage (l: 36; w: 24; t: 6,6 mm). Its most distinct design characteristic is the rectangular, side-notched proximal base, that prompts the definition of the artefact as an endblade. Comparing Specimen x77 to endblades of similar raw material from Qeqertarsuup Tunua, the lack of polish is interesting. Instead, great care has been afforded to bifacially knap the slate-like material, something which very few killiaq endblades from assemblages in Qeqertarsuup Tunua suggest. This could suggest that the group(s) of people that visited Feature 101 were not familiar to or preferred the use of polish for shaping slate-like artefacts. The specimen does demonstrate the willingness for people to diversify raw material use for bifacial component production.

9.1.2. Endscrapers (n=15)

Although easily recognised as endscrapers by their carefully shaped convex distal edge, the sets of technological attributes among the specimens are to an extent heterogenous. Only two endscrapers feature unifacial removals exclusively. The remaining have been bifacially shaped, with ventral removals typically emphasising the proximal area. Eight specimens were classified as having flared edges, while seven featured no such attribute. The distinctness of flared edges among quartz crystal

specimens is arbitrary, however, whereby the flared corners are typically less pronounced than is observed among assemblages of endscrapers made from MCQ. On the other hand, only one of the two MCQ specimens exhibited flared edges. While by no means a significant number, this further points to the ambiguity of flared edges in relation to both raw material type as well as the objects ‘position’ in the generalised *chaîne opératoire*.

Endscraper specimen x88 features a subtly flared edge, but a distinct convex ‘notch’. This feature resembles the proposed endscraper/sidescraper hybrid. The removals that make up the side-notch indicate the specificity of its design, one that does not immediately correspond with a sensible hafting accommodation. Unfortunately, its flared edge—and those of several other quartz crystal specimens examined in the case-study—disallows confident definition of the hybrid design.

Among the smallest endscrapers made from quartz crystal is specimen x104 (l: 18,2; w: 15,7; t: 6,9 mm). It is an intact specimen that exhibit bifacial removal scars. Judging from its size, it appears to have been part of a tool used for delicate scraping of organic material. Further inference from its attributes is, however, difficult. The small size of the lithic component only adds to the difficulty of identifying attributes from such highly translucent lithic material. The shaping of its lateral and ventral areas exemplifies this. Despite not exhibiting flaring at the front edge, it still features a noticeable notch along its left ventral surface. The notch has been deliberately shaped by several small removals, creating a curved indentation into the ventral surface that resembles the typical asymmetric lateral notching in Greenlandic Dorset endscraper technology—but without the typical corner at its convex front edge. This demonstrates how the morphological attributes of flared edges and lateral notching, despite often occurring together, does not consistently define finished component design.

9.1.3. Sidescrapers (n=1)

A single sidescraper was identified in the site assemblage from Feature 101. Specimen x97 is a morphologically distinct sidescraper made of quartz crystal with ~ 70% corticated surface. The specimen has been made from a flat, thick natural nodule of quartz crystal. Only a few unifacial removals were made, while most removals are located laterally along its hafting and working edge area.

9.1.4. Burin-like tool (n=1)

The single burin-like tool examined in the analysis is a small, intact specimen made from a light grey type of MCQ. Overall, its technological attributes indicate that it is a finished component, featuring polished surfaces and the distinct burin-like tool design. However, the lack of polish on the supposed working edge is a novel characteristic. The area is made up by numerous retouch removals. It is considered possible that attempts at rejuvenating the working edge was made before its deposition.

9.1.5. Sideblades (n=4)

The lithic assemblage collected from Feature 101 include four specimens classified as sideblades. These include three specimens of MCQ, and a single made from quartz crystal. Their sizes range from 20,5 to 36,2 mm in length, 16,3 to 20,5 mm in width, and 3,8 to 4,5 mm thickness.

The identification of these specimens helps demonstrate the arbitrary process of type categorisation. Two of the specimens have previously been catalogued as endblades. This re-categorisation is based on the general proportions of the specimens, including thin cross-sections and bifacial removals made relatively evenly from all directions.

Specimen x95, made from a dark brown MCQ material. It is the smallest among the four specimens (l: 20,5; w: 19; t: 4 mm) and has been carefully shaped by bifacial removals to an almost triangular morphology.

Specimen x90 is distinct for its corticated surfaces and retouch exclusively along its edge. This indicates that a small natural flake was selected specifically for the design of a sideblade, requiring only limited sequences of retouch.

9.1.6. Microblades (n=104)

The majority of quartz crystal microblades were found intact, numbering 51 specimens. The remaining specimens were categorised into the following fragmentation types: Short distal (2); long proximal (16); short proximal (2); long distal (3); and medial (7). The dominance of intact microblades as well as specimens with retained proximal area is unusual, but it is difficult to determine if this is due to specific types of deposition.

The MCQ microblades include seven intact specimens. The remaining ten specimens feature the following types of fragmentation: Long proximal (5); short proximal (1); long distal

(4); and medial (5). None of the specimens with an intact distal end indicate any form of knapping error.

Three of the largest quartz crystal microblades, specimens x112, x113, and x114, were refitted. The specimens reveal a brief episode of serial microblade production. There are two factors that tie the three microblades to a single event of production. The first is the size of the three specimens relative to other microblades in the assemblage. The measurements of specimens x112, x113, and x114 range from 41,4 to 42,3 mm in length, 7,9 to 9,2 mm in width, and 4 to 5,8 mm in thickness. These measurements are considerably higher than the average of the assemblage, suggesting that none of the other microblade removals were knapped from the same core as x112, x113 and x114.

9.1.7. Microblade cores (n=20)

See part 5.4.1.

9.1.8. Large flakes/preforms (n=10)

See part 5.4.1.

9.1.9. Flakes (n=114)

Most of the flake specimens identified in the site assemblage from Feature 101 have been knapped from quartz crystal, totalling 92 specimens. The remaining 22 specimens are made from MCQ, including types such as light brown (7), white (14), and blue-grey (1).

9.2. Feature 120

The lithic assemblage of Feature 120 only features three lithic artefacts. Two of the three objects are diagnostic type artefacts, including the fragments of a bifacial endblade, a microblade core. Additionally, a single flake was collected.

9.3. Feature 222

9.3.1. Microblades (n=6)

. Besides the single intact microblade specimen, the remaining specimens are fragmented into the following fragments: Short distal (1), long proximal (1), and medial (2). The single specimen of black MCQ is a medial fragment, without traces of retouch. The microblade specimen of black MCQ resembles the type of MCQ that is known from assemblages in Peary Land and adjacent areas.

9.3.2. Flakes (n=7)

The site assemblage from Feature 222 includes a total of seven flakes. Four have been made from quartz crystal, while three are from a white type of MCQ. The four flakes of quartz crystal vary in size, ranging from flakes between 0-1 cm to two large fragments between 1-2 and 2-3 cm in general measurements. The specimens made from MCQ are each between 1-2 cm in general size, best characterised as ordinary flakes without notable technological attributes. Their homogeneity and small size might suggest that they were deposited following the rejuvenation of a lithic component. A similar inference could be made from the specimens of quartz crystal, but their irregular sizes and attributes makes it difficult to distinguish between deposition following bifacial knapping or microblade production. As the overall assemblage is dominated by microblades, I consider it most conceivable that these are remains from the production of microblade replacements.

9.4. Feature 226

9.4.1. Endscrapers (n=2)

Two endscrapers made from MCQ were identified in the site assemblage from feature 226, specimens x281 and x282. Specimen x281 is a large endscraper of a conspicuous banded brown-to-light brown coloration (l: 43,3; w: 37,2; t: 11,5 mm). It is an intact, bifacially knapped specimen, shaped from a large flake removal. Its front edge is low angled at $\sim 70^\circ$, with ventral removals predominantly at the proximal base. The convex front edge of the endscraper features a single flared edge at its right dorsal side. The flared edge is made from a short but distinct side-notch at the distal area. The proximal area of the specimen tapers into a flat base at the bottom where the remains of a flake platform can be seen. Overall, the technological attributes of specimen x281 appears to be a desired design for what would have been a used and/or useable endscraper component.

During the examination of the Specimen x282, I had trouble with identifying which parts would have been the distal working edge and the proximal hafting area respectively. When the artefact was to be photographed, it was positioned according to a distal/proximal orientation that upon re-examining were identified as its lateral sides. This orientation seems more reasonable when considering that endscrapers with the striking platform of the original flake preform intact usually feature them at the proximal area of the endscraper design. Re-orienting Specimen x282 presents a different design of the endscraper component, from a long distal area and a narrow proximal base, to a broad proximal base and short distal area. Its width and length measurements has therefore been switched accordingly in the database. In either position, the artefact still resembles endscraper components that have been observed in other Greenlandic Dorset assemblages, and it is thus difficult to define the design of the artefact definitively.

Specimen x282 is a unifacially knapped endscraper made from a white type of MCQ, with steep removals going around most of its dorsal circumference (l: 27,1; w: 31,5; t: 10 mm). The ventral surface of the specimen is of a matted colour and texture in contrast to the glossy dorsal surface. This indicates that the specimen has been shaped following heat-treatment of a flake removed from a nodule prior to heat-treatment. Although the inferred design of the lithic component is tentative it none the less features a tapered proximal area with a flat base, suggesting that the object could have been appropriate for hafting.

9.4.2. Sidescrapers (n=1)

A single sidescraper was also identified in the assemblage from Feature 226. Specimen x274 is a bifacially shaped specimen made from quartz crystal (l: 34,4; w: 20,3; t: 10 mm). The specimen is of a peculiar design, resembling the typical sidescraper by the characteristic S-shape. However, the curve angles are characteristically low, and the specimen features atypical proportions—particularly in terms of width and thickness.

9.4.3. Microblade cores (n=6)

See part 5.4.3.

9.5. Feature 243

9.5.1. Endblades (n=3)

Three endblades were identified in the site assemblage: Two made from quartzite, and one from quartz crystal. Both the endblades made from quartzite are of a light grey type and are both short proximal fragments. The intact endblade of quartz crystal, Specimen x314, is a small endblade specimen with a triangular-oval morphology. Its notched, rectangular base is notably small, suggesting that the component was designed for a small composite tool. The proportionally broad medial section suggests that little to no rejuvenation of the component was made while it was hafted.

9.5.2. Endscrapers (n=1)

The classification of the artefact as an endscraper was tentative, as its attributes could resemble those of distal rejuvenation flakes from microblade core preparation. It is the slightly curved lateral removals at the distal area of its ventral surface that eventually made the classification of the artefact as an endscraper appropriate.

9.5.3. Sidescrapers (n=1)

The site assemblage from Feature 243 includes a single sidescraper. Specimen x294 is a large sidescraper (l: 46,8; w: 22,1; t: 5,4 mm) made from a brown-grey type of MCQ. Most of its negative

removal scars indicate small pressure-flaking removals made around the entire artefacts. Its crescent working edge is less pronouncedly curved than most sidescraper specimens, giving the artefact a vague resemblance of an endblade. The low angle of the working edge at $\sim 70^\circ$ is also atypical for sidescrapers. Along with the working edge, it is the proximal area that makes the specimen recognisable as a sidescraper—with a rounded, tanged-shaped, and fluted base. However, the techno-typological attributes of the artefact can only be considered tentative at best.

9.5.4. Microblades (n=35)

See part 5.4.4.

9.5.5. Flakes (n=107)

Flakes made from MCQ that were collected from Feature 243 exhibits different technological characteristics between the raw material types. The variations of grey MCQ flakes featured more distinct technological attributes compared to those made from variations of white and brown MCQ. Most of the specimens of the grey raw material types were observed to be related to core preparation, either as flakes or fragments. Two of the flakes are recognised as removals from bifacial knapping, suggesting that these were debitage from the production or rejuvenation of bifacially knapped lithic components. The white and brown types, on the other hand, exhibited mostly homogenous attributes that only allowed for definition as generic flake debitage. The difference between the two separated groups of material is further pronounced by their general measurements (Table 28, part 5.4.4.).

The most notable specimens among the flakes collected from Feature 243 are five specimens of dark grey MCQ. The two of the largest flakes are distinct remains of a fragmented microblade core, exhibiting traces of microblade removal fronts. The ventral surfaces of the two fragments are not the result of conchoidal fracture, but rather from what appears to be the result of structural failure in the material.

The smallest flakes are of a similar raw material to the two core fragments. One of these is identified as a distal rejuvenation flake and can thus be associated with the large core fragments by its technological attributes as well as by raw material. However, no refits were possible.

9.6. Feature 283

9.6.1. Microblades (n=6)

See part 5.4.5.

9.6.2. Flakes (n=15)

The flakes did not exhibit any defining attributes beyond irregular removal ridges, small bulbs of percussion, and light ventral rippling.

9.7. Feature 291

9.7.1. Microblades (n=4)

Three of the specimens are not labelled, as they were identified among the flake material.

9.7.2. Endblades (n=1)

The lithic endblade identified in the site assemblage is a large (l: 42,2; w: 24,1; t: 6,3 mm), intact specimen of light grey MCQ (x479). Its morphology and technological attributes make it one of the more distinct endblade specimens identified among assemblages from Kap Skt. Jacques, with a broad rectangular proximal base with side-notching and a distal morphology that is triangular-oval, but with a distal edge that almost makes a separate, diagonal front. Observing the negative bifacial removals on either side, one can see that removals are generally larger at its proximal base. This, along with the proportionally large-sized base, makes it conceivable that the specimen was subjected to some degree of component rejuvenation while it was hafted.

9.7.3. Microblade cores (n=1)

A single microblade core specimen—more specifically a distal core rejuvenation removal— was identified in the site assemblage from Feature 291 (specimen x499). The removal exhibits traces of a single microblade removal front, and ~20% cortex across its surface.

9.7.4. Flakes (n=35)

See part 5.4.6.

9.8. Feature 305

9.8.1. Microblades (n=18)

See part 5.4.7.

9.8.2. Sideblades (n=1)

The assemblage contained a single sideblade specimen. Specimen x368 is a fragmented sideblade made from a brown type of MCQ. Limited inference can be made from the artefact, except that a single episode where a cloven-hoof lance was maintained by replacement of its sideblade component. The absence of small flakes associable to the raw material suggests that the replacement was made with a prepared component transported to the site.

9.8.3. Flakes (n=32)

The specimens of light brown MCQ collected from Feature 305 include both retouched (6) and unretouched microblades (8), as well as microblades with traces of core preparation (2). Both specimens with traces of core preparation exhibits a dorsal surface with two negative removal scars alongside a single crested surface. The remaining light brown specimens exhibits dorsal surfaces with negative microblade removals scars ranging from two to four scars.

9.9. Feature 363

9.9.1. Endblades (n=7)

Five endblades have been made from quartz crystal, while two are of blue-grey quartzite. A single endblade of quartz crystal is intact except for a small part of its proximal base missing. The remaining specimens include a short distal fragment, two long distal fragments, and a single short proximal fragment. The intact specimen, registered as KSJ35 in the present technological classification, has been bifacially knapped into the recognisable morphology of a triangular-oval endblade component. However, distinguishing individual removal scars is difficult due to the quality of the quartz crystal from which it is made. The specimen was likely fragmented during use, and subsequently deposited during tool maintenance by component replacement.

The two intact specimens of blue-grey quartzite are distinctly similar in raw material, morphology and size (specimen x467: l: 39; w: 24,5; t: 6 mm; specimen x468: l: 37,7; w: 22,8; t: 5,7 mm). Both feature triangular distal areas with large, broad, side-notched proximal bases. Their discernible removal scars suggest that the lithic components were expertly knapped from a dense and coarse lithic material. Their distinct characteristics are highly similar to an endblade identified in the lithic assemblage from Feature 101.

Fragmentation at the proximal base is also represented by the long distal Specimen KSJ36. The specimen is the remains of a large endblade component made from a quartz crystal nodule distinct for its banded pattern through its medial area. The material appears to be of a different quality to Specimen #35, judging from its more translucent quality and relatively distinct bifacial removal scars. The morphology of the artefact is triangular-oval, but due to its asymmetry also resemblant of the rectangular-oval type. As with specimen KSJ35, no associable fragment was identified in the site assemblage. Considering the size of the endblade, the absence of its proximal fragment is more likely due to its total absence from the site rather than having been overlooked during excavation—although this can only be verified by revisiting the site itself.

9.9.2. Endscrapers (n=7)

Seven endscrapper components were identified in the present analysis. Five were made from quartz crystal, while two are of MCQ. All except a single short distal quartz crystal specimen are intact. Three additional quartz crystal specimens were identified among the flake material. Each of the specimens suggest deposition following component replacements.

Four of the endscrapers feature bifacial removal scars, while three have been unifacially shaped. Flared edges are present on four specimens but are obscure. The fragmented distal specimen appears to have been fragmented right at the area where the flared corners were originally shaped.

Specimen x469 is of a highly unique design that has not been observed in any other Greenlandic Dorset lithic assemblage in the present study. The endscrapper, made from white-grey MCQ, has been shaped into a distinct spoon-like morphology with a proportionally narrow, side-notched proximal base to the broad distal area (l: 39,2; w: 28,9; t: 8,5 mm). It features no flared edges, but a clear, convex front edge. While the specimen is bifacially knapped, it features ventral removals exclusively at its base. Arguably, the design and technological attributes suggests that the

artefact was once part of a composite tool. What may have prompted such a unique design is unclear, but the narrow base is evidence that the design was largely due to facilitate its hafting to a small hafting base of a composite tool. One possible explanation is that the available material for making the tool haft necessitated an atypically small hafting design. To maintain a diverse scraper tool kit, design expediency was prompted for the specific lithic component.

9.9.3. Sideblades (n=1)

A single fragmented sideblade specimen was identified in the present analysis. A notable amount of what appears as cortex is remaining on the specimen, suggesting that it was produced from a small, natural flake.

9.9.4. Microblades (n=8)

A total of eight microblade specimens were identified. Each of the specimens feature traces of hafting retouch, strongly suggesting that they were deposited following component replacements. Only a single microblade is intact, while other types of fragmentation include long proximal (3), medial (2), and long distal fragmentation (1). Five specimens feature dorsal surfaces with negative blade removal scars, while the remaining three exhibits scars of cresting removals for core front preparation. None of the specimens could be refitted, nor were any associable fragments identified in the site assemblage. However, it should be noted that the translucent quality of quartz crystal as well as the presumed small size of the missing fragments make them difficult to account for among the flake debitage.

9.9.5. Microblade cores (n=8)

See part 5.4.8, Chapter 5.

9.9.6. Large flakes/preforms (n=10)

One core preform specimen features a carefully shaped crested ridge that was followed by a failed removal attempt ending in a severe hinge fracture. Another core specimen features the typical technological attributes of a prepared microblade core, but it is evident from the numerous hinges on its front that no successful microblade removal was achieved. An endblade preform exhibits

several bifacial hinge removals that likely rendered the object unsuitable for further knapping. The commonality of such errors strongly suggests the difficulty of knapping quartz crystal raw material.

9.9.7. Flakes (n=41)

A large portion of the quartz crystal debitage are fragments rather than flakes, indicating irregular removals at primary stages of lithic reduction. This could arguably be connected to the presence of large preforms in the site assemblage. The flakes are also generally large, with only two specimens measuring between 0-1 cm² in size, while remaining flakes are between 1-2 and 2-3 cm². Additionally, two large flakes exhibit attributes that defines them as microblade core rejuvenation flakes.

9.10. Feature 382

9.10.1. Endblades (n=3)

See part 5.4.9.

9.10.2. Microblades (n=35)

See part 5.4.9.

9.10.3. Microblade cores (n=1)

See part 5.4.9.

9.10.4. Flakes (n=90)

See part 5.4.9.

9.10.5. Large flakes/preforms (n=1)

See part 5.4.9.

9.11. Feature 426

9.11.1. Endblades (n=23)

Each specimen of MCQ is of a unique type, including spotted red-grey, banded blue-grey, blue-grey, white-grey, light grey, and brown-grey. The blue-grey MCQ of specimen x553 is highly resemblant of the raw material type commonly observed in assemblages from Peary Land. Specimen x664 is a small intact endblade specimen made from brown-grey MCQ (l: 27,8; w: 18,5; t: 4,8 mm). The component has been bifacially shaped into a triangular morphology, with a broad and distinctly side-notched proximal base. By observing the knapping removals across its surface, one can see that the distal area differs from the proximal by small and numerous flaking removals that has removed proportionally more mass. This suggests that the component was rejuvenated as an attached component. Another possible explanation is that shaping a proportionally smaller distal area would mitigate the possibility of component breakage by a sturdier design. Both possibilities could point to the object having been produced in a situation of raw material scarcity, prompting considerate curation of lithic components.

Specimens of quartzite include two of a grey type, three of white, and one of dark-grey. Endblades made from quartzite include a higher proportion of intact specimens, with three specimens intact. One of these do, however, exhibit a minor fragmentation of its distal base—with the typical diagonal fracture. The remaining specimens include one long proximal and two short proximal fragments. The specimens of quartz crystal are all bifacially knapped, with none being intact. Most of the quartz crystal specimens are long distal fragments (6), while other types of fragmentation include short distal (2), long proximal (1), and short proximal (2). The endblades that allow morphological classification include types such as triangular-oval (2), oval (1), and rectangular-oval (5).

Specimen x544 is a uniquely large lithic endblade component made from white quartzite (l: 60,3; w: 23,1; t: 8,4 mm). Its morphology is distinct: A triangular-oval, banana-like shape. The rectangular proximal base is side-notched and is proportionally small relative to the large distal area.

Among the largest intact endblades identified in the site assemblages from Kap Skt. Jacques is specimen x544. Despite its relatively coarsely grained quartzite structure, the knapper was able to proportionally shape the blade component into an asymmetrical oval morphology. The proximal

base is rectangular in shape but is narrow relative to the distal area. Atypically, it does not feature any visible side-notching.

9.11.2. Endscrapers (n=11)

See part 5.4.10.

9.11.3. Sideblades (n=2)

See part 5.4.10.

9.11.4. Microblades (n=38)

Types of fragmentation identified among specimens of quartz crystal include long proximal (10); short proximal (1); long distal (3); and medial (6). Observed types of fragmentation among specimens of MCQ include short distal (1); long proximal (2); long distal (2); and medial (1).

Microblades made from quartz crystal include thirteen specimens with irregular dorsal surfaces, and sixteen with regular surfaces. Specimens of MCQ include a single with an irregular dorsal surface, six with regular surfaces, and two with an extremely regular surface. Few microblades exhibited any traces of retouch, with only three specimens among microblades of quartz crystal. Among specimens the proportional amount is higher, with four of nine specimens exhibiting retouch.

9.11.5. Microblade cores (n=47)

The specimens were divided into several different categories by tentatively generalising their techno-morphological characteristics: Keeled microblade core (12); irregular microblade core (6); distal rejuvenation flake/fragment (19); front rejuvenation flake (4); platform rejuvenation flake (1); and core fragment (5).

Microblade core specimen x617 collected from Feature 426 represents a unique case of microblade technology at Kap Skt. Jacques. It is among the few specimens that have been made from MCQ, in this case of a light grey type. The most striking quality of the artefact is its small size (l: 22,2; w: 14; t: 13,1 mm). Its technological attributes indicate skilful and careful curation of its potential to provide fresh microblade components. This is best observed by the remaining traces of microblade removals. Although microblades were only removed from a single, low angled front

immediately prior to its deposit, the horizontally positioned ridges on its back provides evidence of removals having been made at a much earlier stages in the core's history of microblade production. The remaining removals scars suggests that at one point, the core was considerably larger relative to its final, exhausted state. The core was finally spent of its production potential by hinge fractured removal at its final front.

The exhausted state of the core indicates prolonged circulation prior to its deposit. Considering the relative absence of microblade specimens of similar raw material, it is possible that the core had been part of movements that did not emerge locally, especially when compared to the highly abundant remains of quartz crystal microblade cores. Thus, one could conceive that a group visited a site following movements in landscapes with limited availability of MCQ.

9.11.6. Large flakes/preforms (n=10)

See part 5.4.10.

9.11.7. Flakes (n=189)

A total of 189 flakes and fragments were identified in the site assemblage from Feature 426. Most of the assemblage is made from quartz crystal, numbering 175 specimens. The assemblage of quartz crystal debitage includes both flakes and fragments, as well as five pieces knapped during production and/or maintenance of cores. Specifically, the specimens related to knapping of cores include three core fragments and two core rejuvenation flakes. Their relatively large sizes—ranging from 22,5 to 30 mm in length, 9,3 to 17,2 mm in width, and 4,9 to 7,7 mm thickness—suggest that they were part of preform procedures of microblade core production.

The remaining flakes and fragments of quartz crystal include ten specimens with notable traces of cortex. Twelve specimens measure between 0-1 cm², 137 between 1-2 cm², nineteen between 2-3 cm², and a single flake between 3-4 cm². The assemblage is thus highly indicative of on-site production and maintenance of quartz crystal cores and components.

Twelve specimens have been made from MCQ. The specimens are predominantly flakes but also includes two fragments. One white-grey fragment is clearly the remains of bifacial endblade production, with bifacial removal scars across its surface. A flake of white-grey MCQ features attributes that associate it with distal core rejuvenation removals. The lack of microblades

of white-grey MCQ related to on-site production suggests that this removal was made as core maintenance prior to departure from the site.

9.12. Feature 428

9.12.1. Microblades (n=4)

See part 5.4.11.

9.12.2. Microblade cores (n=1)

Only a single microblade core was identified in the site assemblage. The specimen is a distal core rejuvenation fragment of quartz crystal, with traces of a single removal front and with a surface coverage at ~ 10 % by cortex.

9.12.3. Endblades (n=6)

Both endblades of MCQ are intact. The quartzite and quartz crystal specimens are all long distal fragments.

9.12.4. Sideblades (n=1)

The single sideblade identified in the lithic assemblage is a relatively large, fragmented specimen of quartz crystal (l: 26; w: 16,3; t: 4,7 mm). It was first classified as a fragmented endblade, but its morphology as well as the positioning of bifacial removals is more akin to typical attributes of sideblades.

9.12.5. Sidescrapers (n=1)

Specimen x414 of brown MCQ is the only fragmented sidescraper found at Kap Skt. Jacques, with a large, long distal part intact (l: 38,2; w: 9,7; t: 9,6 mm). It is predominantly shaped by unifacial removals—its ventral surface suggesting that it was made from a large flake removal. Its deposition likely resulted following replacement by a prepared component kept in supply.

9.12.6. Flakes (n=11)

The small assemblage of flake debitage collected at Feature 428 includes eleven individual specimens. Identified raw material includes five flakes and one undiagnostic fragment of quartz crystal, four flakes of MCQ of which three are of dark grey and one of light grey, and a single flake of white quartzite. The specimens are generally small, five ranging between 0-1 cm² and another five between 1-2 cm². The flake from quartzite is the largest, between 2-3 cm² in size. Overall, the general measurements of the debitage suggests that these were deposited following component retouch for rejuvenation and maintenance, rather than the production of new components.

Appendix D – Illustrations of artefacts from Qeqertarsuup Tunua

10.1a Annertusuaqqap Nuua Photos

a. Endblades

1. AN11
2. AN96
3. AN12
4. AN57
5. AN6
6. n/a
7. AN8
8. AN1
9. AN9
10. n/a
11. AN7
12. AN18
13. AN40
14. AN88

b. Sideblades

1. AN1

c. Preform

1. AN10

d. Endsrapers

1. AN3
2. AN22
3. AN16
4. AN20
5. AN14
6. AN8

7. AN11

8. AN4

9. AN24

- 10.

- AN23

- 11.

- AN7

e. Sidescrapers

1. AN1

2. AN3

f. Burin-like tools

1. AN8

2. AN7

g. Adzes

1. AN4

2. AN10

3. AN12

h. Microblade cores

1. AN1

2. AN3

i. Microblades

1. AN125

2. AN208

3. AN93

4. AN164

10.1b Annertusuaqqap Nuua

Drawings

a. Endblades

1. AN11

2. AN6

3. AN1

4. AN9

5. AN40

6. AN88

b. Endscrapers

1. AN20

2. AN14

3. AN8

c. Burin-like tools

1. AN8

2. AN7

d. Microblades

1. AN125

2. AN164

3. AN208

10.2a Umiartorfik A Photos

a. Endscraper

1.UMA27

b. Burin-like tool

1.UMA60

c. Sideblade

1. UMA103

10.2b Umiartorfik A Drawings

a. Endscraper

1.UMA27

b. Burin-like tool

1.UMA60

c. Sideblade

1. UMA103

10.3a Umiartorfik B Photos

a. Endblades

1. UMB148

2. UMB147

3. UMB152

4. UMB153

5. UMB144

b. Sideblades

1. UMB152

2. UMB20

3. UMB22

4. UMB21

c. Burin-like tools

1. UMB62

2. UMB68

3. UMB66

4. UMB61

5. UMB67

6. n/a

d. Microblade cores

1. UMB10

2. UMB32

3. UMB14

e. Endscrapers

1. UMB39

2. UMB28

f. Sidescrapers

1. UMB8

2. UMB4

3. UMB5

4. UMB6

5. UMB7

10.3b Umiartorfik B Drawings

a. Endblades

1. UMB148

2. UMB147

3. UMB152

4. UMB153

5. UMB144

b. Sideblades

1. UMB152

c. Sidescrapers

1. UMB8

2. UMB5

3. UMB6

4. UMB7

d. Burin-like tools

1. UMB62

2. n/a

3. UMB61

4. UMB66

e. Endsrapers

1. UMB39

f. Microblade cores

1. UMB10

2. UMB32

10.4a Umiartorfik C Photos

a. Microblade cores

1. UMC38

2. UMC33

b. Microblades

1. UMC516

2. UMC518

c. Endsrapers

1. n/a

10.4b Umiartorfik C Drawings

a. Microblade cores

1. UMC38

10.5a Innartalik I Photos

a. Endsrapers

2.IN44

3.IN45

4.IN46

b. Microblades

5.IN532

c. Burin-like tools

6.IN71

10.5b Innartalik I Drawings

a. Endsrapers

1.IN44

2.IN45

3.IN46

b. Burin-like tools

1.IN71

10.1a. Annertusuaqqap Nuua

a

1

2

3

4

5

6

7

8

9

10.1b. Annertusuaqqap Nuua

a

b

10.5a. Innartalik I

a

1

2

3

b

1

c

1

10.5b. Innartalik I

a

b

10.2a. Umiartorfik A

a

b

c

10.3b. Umiartorfik B

10.4b. Umiartorfik C

a

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|

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1

10.5b. Innartalik I

a

b

Appendix E – Illustrations of artefacts from Northernmost Greenland

11.1a Engnæs Photos

a. Preforms

1. ENG35/L1.9406a/b

b. Endblades

1. ENG177/L1.9408
2. ENG178/L1.9405
3. ENG182/L1.9397

c. Endsrapers

1. ENG47/L1.9450

d. Microblades

1. ENG560/L1.9440
2. n/a /L1.9449
3. ENG559/L1.9443
4. ENG558/L1.9442

e. Adzes

1. ENG38/L1.9409

11.1b Engnæs Drawings

a. Endblades

1. ENG177/L1.9408
2. ENG178/L1.9405
3. ENG181/L1.9397

b. Endsrapers

1. ENG47/L1.9450

c. Microblades

1. n/a /L1.9440
2. ENG559/L1.9443
3. ENG558/L1.9442
4. n/a /L1.9449

11.2a Vandfaldsnæs Photos

a. Endblades

1. VAN186/L1.7659
2. VAN183/L1.7613
3. VAN188/L1.7633
4. VAN184/L1.7650

b. Endscraper

1. n/a /L1.7610
2. n/a /L1.6504
3. n/a /L1.7615
4. n/a /L1.7617
5. VAN50/L1.7632
6. VAN49/L1.9568
7. VAN48/L1.7640

c. Adzes

1. VAN39/L1.7634ab

d. Burin-like tools

1. VAN73/L1.7631
2. VAN74/L1.6505
3. VAN72/L1.7624
4. n/a /L1.7623

e. Sidescrapers

1. VAN11/L1.9768

f. Atypical endblade

1. VAN187/L1.7607

g. Microblade cores

1. VAN131/L1.7622

h. Distal rejuvenation flakes

1. VAN6547/L1.7653

i. Microblades

1. VAN570/L1.7598

2. VAN571/L1.7608

1. KHM55/L1.7462

2. KHM54/L1.9831

d. Large flakes/preforms

1. KHM41/L1.7470ab

11.2b Vandfaldsnæs Drawings

a. Endblades

1. VAN186/L1.7659

2. VAN183/L1.7613

3. VAN184/L1.7650

b. Endscrapers

1. n/a /L1.7610

2. VAN51/L1.7616

3. VAN49/L1.9568

4. VAN48/L1.7640

c. Burin-like tools

1. VAN74/L1.6505

d. Microblades

1. VAN570/L1.7598

2. VAN571/L1.7608

e. Microblade cores

1. VAN131/L1.7622

11.3a Kap Harald Moltke Photos

a. Microblade cores

1. KHM39/L1.7464

2. KHM40/L1.9840

3. KHM41/L1.9841

4. KHM42/L1.7463

b. Microblades

1. KHM600/L1.8260

c. Endscrapers

11.3b Kap Harald Moltke Drawings

a. Endscrapers

1. KHM54/L1.9831

b. Microblade cores

1. KHM40/L1.9840

2. KHM42/L1.7463

3. KHM39/L1.7464

4. KHM41/L1.9841

11.4a Kap Mylius-Erichsen Photos

a. Endblades

1. KME190/L1.9728

2. KME191/L1.9732

3. KME192/L1.9616

b. Endscrapers

1. KME53/L1.9734

c. Sideblades

1. KME193/L1.9733

d. Microblades

1. KME594/L1.9606

2. KME593/L1.9611

3. VAN576/L1.7664

4. KME598/L1.9613

11.4b Kap Mylius-Erichsen Drawings

a. Endblades

1. KME190/L1.9728
2. KME191/L1.9732
3. KME192/L1.9616

b. Endscrapers

1. KME53/L1.9734

c. Sideblades

1. KME193/L1.9733

d. Microblades

1. KME594/L1.9606

11.5a Hvalterraserne Photos

a. Endblades

1. n/a
 2. HVA195/L1.10137
- #### b. Large flakes/preforms
1. HVA43/L1.10141
 2. HVA44/L1.10142
 3. HVA46/L1.10144

11.5b Hvalterraserne Drawings

a. Endblades

1. HVA195/L1.10137

b. Preforms

1. HVA43/L1.10141

11.6a Kap Holbæk Photos

a. Endblades

1. KHO197/L1.6953
2. KHO201/L1.6970
3. KHO199/L1.6967
4. KHO198/L1.6971
5. KHO200/L1.6958
6. KHO196/L1.6971

b. Burin-like tools

1. KHO75/L1.6956

c. Endscrapers

1. KHO50/L1.6962
2. KHO56/L1.6968

d. Preforms

1. KHO52/L1.6954b

e. Sideblades

1. KHO27/L1.7014

f. Adzes

1. KHO43/L1.7004
2. KHO42/L1.6952
3. KHO44/L1.7003

g. Microblades

1. KHO606/L1.6979
2. KHO605/L1.6980
3. KHO611/L1.6976
4. KHO609/L1.6982
5. KHO610/L1.6977
6. KHO613/L1.6981

h. Refitted cloven hoof lance

11.6b Kap Holbæk Drawings

a. Microblades

1. KHO606/L1.6979

2. KHO605/L1.6980

3. KHO611/L1.6976

4. KHO609/L1.6982

5. KHO610/L1.6977

6. KHO613/L1.6981

b. Burin-like tools

1. KHO75/L1.6956

c. Endblades

1. KHO605/L1.6980

d. Sideblades

1. KHO27/L1.7014

e. Endscrapers

1. KHO56/L1.6968

e

1

11.1b. Engnæs

a

b

c

b

c

d

e

b

3

4

11.4a. Kap Mylius-Erichsen

a

b

c

d

11.5a. Hvalterrasserne

a

b

11.5b. Hvalterrasserne

a

b

11.6b. Kap Holbæk

a

b

c

d

e

Appendix F – Illustrations of artefacts from Kap Skt. Jacques

12.1a Feature 101 Photos

a. Endblades

1. KSJ233/x77
2. KSJ237/x88
3. KSJ223/x241
4. KSJ234/x78
5. KSJ224/x240
6. KSJ265/x314
7. KSJ264/x85

b. Endsrapers

1. KSJ62/x98
2. n/a
3. KSJ63/x99
4. n/a
5. KSJ65/x104

c. Sidescrapers

1. KSJ13/x97

d. Sideblades

1. KSJ31/x95
2. KSJ37/x92

e. Burin-like tools

1. KSJ76/x85

f. Microblade cores

1. KSJ130/x242

g. Microblades

1. KSJ267/x113
2. KSJ49/x114
3. KSJ50/x115
4. KSJ128/x160
5. KSJ70/x126

6. KSJ75/x131

7. KSJ123/x35

8. KSJ95/x161

9. KSJ118/x248

10. KSJ119/x250

11. KSJ116/x246

12. KSJ132/x167

12.1b Feature 101 Drawings

a. Endsrapers

1. KSJ64/x99

b. Burin-like tools

1. KSJ76/x85

12.2a Feature 226 Photos

a. Endsrapers

1. KSJ85/x281
2. KSJ83/x282

b. Sidescrapers

1. KSJ14/x274

c. Microblade cores

1. KSJ121/x275

12.3a Feature 243 Photos

a. Endblades

1. KSJ249/x293

b. Sidescrapers

1. KSJ13/x294

c. Endsrapers

1. KSJ76/x315

d. Microblade core fragments

1. n/a

2. n/a

3. n/a

4. n/a

5. n/a

12.4a Feature 291 Photos

a. Endblades

1. KSJ251/x479

b. Microblades

1. KSJ198/x480

2. KSJ199/x481

3. KSJ200/x482

12.4b Feature 291 Drawings

a. Endblades

1. KSJ251/x479

12.5a Feature 363 Photos

a. Endblades

1. KSJ259/x467

2. KSJ260/x468

3. KSJ240/n/a

4. KSJ242/n/a

b. Endscrapers

1. KSJ84/x469

2. KSJ74

3. KSJ87/x470

4. KSJ92/x477

c. Nodules

1. KSJ71

2. KSJ72

d. Microblade cores

1. KSJ129/x435

12.6a Feature 426 Photos

a. Endblades

1. KSJ205/x554

2. KSJ262/x545

3. KSJ217/x550

4. KSJ219/x547

5. KSJ214/x551

6. KSJ263/x544

7. n/a

8. KSJ213/xx548

9. KSJ216/x556

10. KSJ261/x664

11. KSJ215/x546

12. KSJ220/x553

13. KSJ221/x553

b. Endscrapers

1. KSJ86/x570

2. KSJ60/x571

c. Sideblades

1. KSJ29/x564

d. Microblade cores

1. KSJ58/x612

2. n/a

e. Preforms

1. x690

12.6b Feature 426 Drawings

- a. Endblades
 - 1. KSJ261/x664
 - 2. n/a
- b. Microblade cores
 - 1. KSJ58/x612

12.7a Feature 428 Photos

- a. Endblades
 - 1. KSJ245/x412
 - 2. KSJ244/x415
- b. Microblade cores
 - 1. KSJ84/x420
- c. Sidescrapers
 - 1. KSJ12/x414

12.7b Feature 428 Drawings

- b. Sidescrapers
 - 1. KSJ12/x414

12.2a. Feature 226

a

1

2

b

c

1

1

12.4a. Feature 291

a

b

12.4b Feature 291

a

12.5a. Feature 363

a

b

c

d

12.6b. Feature 426

a

b

12.7a. Feature 428

a

1

2

b

1

c

1

12.7b. Feature 428

a