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University of Bergen Archaeological Series

The Stone Age Conference in Bergen 2017

Dag Erik Færø Olsen (ed.)

UNIVERSITY OF BERGEN

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Preface

This anthology is based on contributions presented as part of *The Stone Age Conference in Bergen 2017 – Coast and Society, research and cultural heritage management*. The conference was co-organized by the Department of Archaeology, History, Cultural Studies and Religion (AHKR) at the University of Bergen and the Department of Cultural History at the University Museum of Bergen (UM). The organizing committee included Dag Erik Færø Olsen (leader) and Tina Jensen Granados from AHKR, together with Leif Inge Åstveit and Knut Andreas Bergsvik from UM.

The Stone Age Conference in Bergen 2017 was the third instalment of the "Stone Age Conference" series to be organized in Norway. The first conference was held in Bergen in 1993 (Bergsvik *et al.* 1995) and the second in Molde in 2003. The purpose for the 2017 conference in Bergen was to gather archaeologists with common interest in the Norwegian Stone Age and from all parts of the national Stone Age community. Several prominent research communities exist in Norway today and representatives from all University departments and from the majority of the County Municipalities was gathered to share current results and to discuss common issues and strategies for future research.

Since the last conference in 2003, the cultural heritage management in Norway has made large quantities of new archaeological data accessible for research. Such extensive new data has provided new methodological and theoretical challenges and opportunities which is reflected in the scope of research published within the last 20 years.

The Stone Age Conference in Bergen 2017 wanted to reflect the new empirical, theoretical and methodological diversity, and to highlight how these developments could be integrated into the cultural heritage management and within future research. The conference was structured by current themes and approaches and divided into five main sessions (including a poster session) and seven session themes (see Sessions and papers at the end of this volume).

An increasing association with the *natural scientific approaches* was one important theme of the conference focusing on research on climate change, aDNA and new and improved methods for analysis and dating. Related to this was the general theme *technology* were studies on raw material and technological studies are used in mobility- and network analysis.

Managing and utilizing the large quantities of data generated over the last two decades was the basis for the themes *demography* and *subsistence changes*. The theme *methodological developments* included increasing digitalization and how this is used in rescue archaeology, with challenges and new possibilities. The conference also wanted to explore aspects of *ritual communication* where various forms of expressions, such as rock art, could elaborate and increase our understanding of several of the other main themes mentioned.

During the three days of the conference a total of 46 15 minutes presentations addressed various topics and aspects within the seven session themes. All sessions were led by session leaders and three of the conference sessions were introduced by key note speakers.

After the conference, it was decided to publish an anthology, inviting all participants to contribute including the poster participants. The publication was to be in the University

of Bergen Archaeological Series, UBAS, and with Dag Erik Færø Olsen as editor of the anthology. Ten papers were submitted from all the sessions and is representative of the topics presented and discussed during the three-day conference. The papers included in this volume are organized mainly geographically starting with Northern Norway moving southwards.

Kenneth Webb Vollan focuses on housepit sites in Arctic Norway using radiocarbon dates for distinguishing reuse or occupational phases. He presents a method for analysing dates following the Bayesian approach and shows that the housepits were reused to a much larger degree than previous acknowledged.

Skule Spjelkavik and *Axel Müller* explores similar topics in their paper about quartz crystal provenance. By using laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) they were able to compare debitage from the Early Mesolithic settlement site Mohalsen I at the island Vega with samples from 19 known sources in Norway. This is especially interesting since there are no known quartz crystal occurrences at Vega and was consequently brought from the main land or other areas. This study shows the potential for using this method, even though no clear parallel to the Mohalsen debitage could be identified in the analysed material.

Jan Mangerud and *John Inge Svendsen* explores colonization processes from a geological perspective. They document how an ice sheet margin presented a physical barrier across the Oslofjord preventing human immigration until the onset of the Holocene, providing an interesting backdrop for discussing aspects of colonization processes in the Early Mesolithic.

Arne Johan Nærøy discusses the use of tools and behaviour patterns based on use-wear analysis of quartz assemblage from the site 16 Budalen in Øygarden, Hordaland County. He is able to distinguish two individuals operating at the site suggesting spatially segregated work operations. Nærøy shows through this study the potential for functional analysis of lithic material from settlement sites.

Astrid Nyland, Kidane Fanta Gebremariam and *Ruben With*'s contribution represents both the new technological and methodological developments and the interdisciplinary nature of archaeology today. This paper explorers the potential for using pXRF for regional provenance analysis of greenstone adzes in western Norway. This study revisits an older interpretation of the division of this region into two social territories in the Middle and Late Mesolithic. The results show that the method is robust and well suited for studying green stone and the authors can also largely confirm the original interpretations based on distribution networks of Mesolithic adzes.

Birgitte Skar discusses the early postglacial migration into Scandinavia based on aDNA studies on two Early Mesolithic Norwegian skeletons. Skar's results confirms the recent interpretation of a second migration into Norway from the Northeast thus contributing to the overall narrative of the colonization of Norway.

Almut Schülke revisits the topic of Mesolithic burial practises in Norway based on new data from recent excavations. Schülke highlights that human remains are often found at settlement sites, opening for discussions of various relationships between the living and the dead and human-nature engagement.

Krister Eilertsen presents results from an excavation of an Early Neolithic hut in Rogaland, Southwestern Norway. He discusses classical interpretative challenges where the lithic material and ^{14}C-datings are not comparable. Eilertsen emphasise the importance of not dismissing difficult results but rather try to find an answer to the differences in light of a wider analysis of the area including various natural and cultural processes. He is thus able to explain the contrasting data and provide new insight into settlement patterns and economy at the start of the Neolithic.

Dag Erik Færø Olsen reviews the rock shelters in the mountain regions of Hardangervidda and Nordfjella. The previous interpretation of these settlement sites as primarily from the Late Neolithic and onwards is discussed based on a reclassification of archaeological material. The results show that rock shelters have been used from at least the Middle Mesolithic and in some cases with an intensification and stronger continuity after 2350 BC.

Gaute Reitan discusses the chronological division of the Mesolithic based on new data from excavations the last 20 years. Reitan presents a revised chronology for the Mesolithic in Southeast Norway dividing each of the three main phases into two sub-phases, adding two new phases to Egil Mikkelsen's original from 1975.

Acknowledgements

On the behalf of the organizing committee, we would like to thank all participants of *Steinalderkonferansen i Bergen 2017* for sharing their knowledge and for the discussions that followed at the conference. We also want to express our gratitude to the conference key note speakers, Prof. Kjel Knutsson (Dep. of Archaeology and Ancient History, Uppsala University), Assoc. Prof. Per Persson (Dep. of Archaeology, Museum of Cultural History, University of Oslo) and Prof. Charlotte Damm (Dep. of Archaeology, History, Religious Studies and Theology, The Arctic University of Norway) for introducing three of the conference sessions. This gratitude is also extended to five session leaders, Assoc. Prof. Arne Johan Nærøy (Museum of Archaeology, University of Stavanger), Prof. Marianne Skandfer (The Arctic University Museum of Norway), Assoc. Prof. Birgitte Skar (Dep. of Archaeology and Cultural History, NTNU University Museum), Prof. Hans Peter Blankholm (Dep. of Archaeology, History, Religious Studies and Theology, The Arctic University of Norway) and Prof. Almut Schülke (Dep. of Archaeology, Museum of Cultural History, University of Oslo).

During the three-day conference the committee received assistance from voluntary students from The University of Bergen and they provided valuable help during the conference.

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The editor of this anthology would further like to express gratitude to all the anonymous peer reviewers whose valuable comments and insights has made this publication possible.

Last, but not least, thank you to the authors of this anthology for the patience and work on the papers that make out this volume.

Dag Erik Færø Olsen and Tina Jensen Granados – Oslo 2021

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Dag Erik Færø Olsen

Stone Age rockshelters in the high mountains

Stone Age rockshelters in the high mountains

In 2016, the University of Bergen conducted an archaeological field school at Hallingskeid in the high-mountains in Ulvik County, western Norway. One of the sites investigated was a boulder-shelter with a cultural layer that showed periodical activity from the Late Mesolithic, the Neolithic, and the Bronze Age. At the time, this was the first boulder-shelter to be investigated in these mountain areas since the 1970s and provided valuable insight into the chronological depth of the activity at these permanent shelters. This raised the question whether this site was an anomaly or if these types of settlement structures were equally 'important' also before the transition to farming? Permanent shelters have received less focus as research subject the last 40 yerars, especially in the high mountains. A larger study of the Hardangervidda and Nordfjella mountain areas show a considerable use of these habitation structures at least from the Late Mesolithic and on. This paper aims to look at rockshelters and boulder-shelters in a longer perspective with a focus on their use before and after the Middle-Late Neolithic (MN-LN) transition to farming c. 2350 BC to discuss their importance among hunter-fisher-gatherer communities in South Norway.

Introduction

In this paper, rockshelters as settlement sites in the high mountains will be reviewed addressing two topics – the hypothesis stating that these sites were primarily used from the Late Neolithic by farmers (Indrelid 1994, p. 229, 269) and the site type as part of an overall settlement pattern in the mountain areas, using results from a recent reclassification of the archaeological material with ^{14}C dates (Olsen 2020). In order to differentiate between geologically different types, the shelters will be either referred to as boulder-shelter or rockshelter. The former is made up by one or several larger glacier transported boulders, creating shelters from wind and rain. The latter is naturally occurring cliff overhangs forming a roof over a living space. They vary in size and form and are often situated away from contemporary open-air settlement sites.

The study area Hardangervidda and Nordfjella is situated in the middle of South Norway and effectively separate eastern from western Norway (Fig. 1). The two adjacent mountain areas comprise a rich and diverse archaeological material with activity form the Early Mesolithic and throughout the Middle Ages. In prehistory, this activity was mainly seasonal with the purpose of hunting reindeer, a tradition that is still practised today. The hunters came from groups with different social and cultural background from both eastern and western Norway and social interaction could have been motive as well. In a study (Olsen 2020) 81 sites was

analysed, consisting of 61 excavated and 20 surveyed sites, with a general dispersal in the study area. Of these, seven sites are defined as boulder-shelters and four as rockshelters (Fig. 1) covering a long time span based on archaeological material and ^{14}C dates. The 81 sites are representative for activity from at least the last part of the Late Mesolithic and throughout the Bronze Age (c. 4500–500 BC) and are well suited for discussing settlement and subsistence in a long-term perspective.

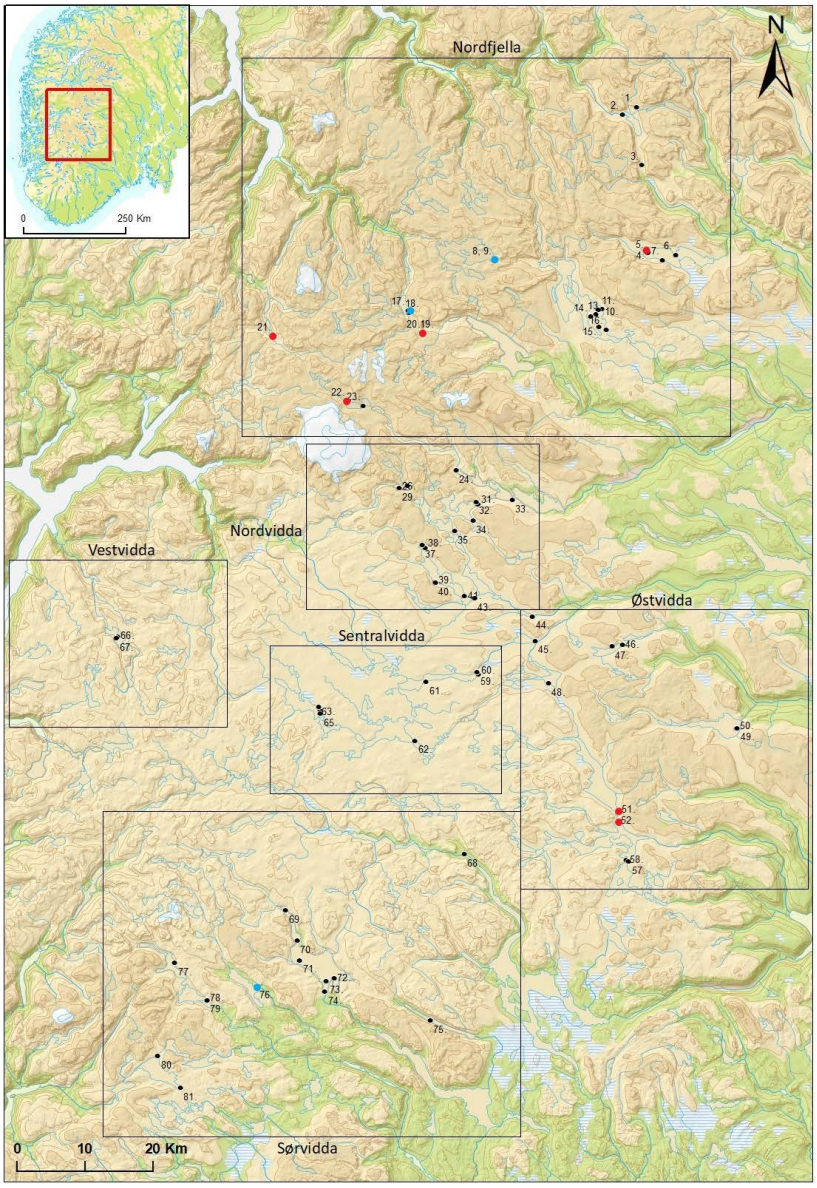

***Figure 1**: The study area divided into sub-regions and with the analysed sites. Rock shelters and boulder-shelters marked with blue and red respectively.*

Caves and rockshelters (no. *hule and heller)* have a long history of research in South Norway dating back to the 1800s (e.g. Bendixen 1870, Brøgger 1907, Bøe 1934, Gjessing 1920). These sites were mostly situated at the coast and were initially interpreted as short term, seasonal hunting stations (Bergsvik and Storvik 2012, p. 24). This interpretation is still relevant today as a general description for the type of activity that took place in rockshelters and caves (Bjerck 2007) and might be particularly true for the sites in the high mountains. Several rockshelters have been excavated in the recent years along coastal South Norway (e.g. Bergsvik 2016) but few in the mountain areas (an important exeption is Skrivarhellaren in the Årdal mountains in western Norway e.g. Prescott 1995, Prescott and Melheim 2017). Several have however been investigated in the Hardangervidda and Nordfjella area between the late 1950s and throughout 1970s as part of the development of hydroelectricity (Indrelid 1994, Martens and Hagen 1961).

Even though little research has been done on these type of settlements in the mountain areas in recent years, some studies has been conducted in western Norway. The most important was 'det Vestnorske Hellerprosjektet' (the western Norwegian rockshelter project) which focused on rockshelters in Herand, a small hamlet in Jondal municipality in Hordaland County. These had not been excavated earlier and several rockshelters provided information on human occupation and activity from around 7000 BC and well into the Iron Age (e.g. Bergsvik and Hufthammer 2009, Bergsvik and Storvik 2012). As part of this project, a master thesis by Storvik (2011) investigated 84 caves and rockshelters in Rogaland County in southwestern Norway which included nine rockshelters from the mountain areas but no boulder-shelters. An estimation was made of varying intensity in use of the 84 sites and relevant results for this discussion is a possible increase from the Mesolithic to the Neolithic, followed by a slight decrease in the late Neolithic/Early Bronze Age (Storvik 2011, p. 31, see also Bergsvik and Storvik 2012). This indicates that the degree of activity was at least at similar levels before and after 2350 BC, possibly higher in the older phases. Of the nine mountain sites, four had activity from the Mesolithic and the Neolithic, one with activity both before and after 2350 BC. Three sites had a general Stone Age dating and one with activity after 1500 AD. There are no comparable studies of caves and rockshelters in eastern Norway and it is difficult to determine if the trends in activity seen in Rogaland can be transferred to eastern parts of Norway. The above review still provides a basis for analysing the results from Hardangervidda and Nordfjella in order to discuss changing patterns of activity.

I will mention one other study of a well-known rockshelter, Bukkhammeren, situated in the mountain areas of Østerdalen at the border between middle and south Norway (Gustafson 1990). The activity in the shelter was ^{14}C dated to the Mesolithic, the Neolithic and the Iron Age, including Late Neolithic and Early Bronze Age. The sparse lithic material supports the dates in general, but no bifacial material was found to support activity in the period after 2350 BC. A rich bone material suggests that hunting for beaver was the primary activity, which took place sporadically over a period of 6000 years, in addition to hunting big game, birds and fishing. The activity, except hunting for beaver, follows the same pattern as on other mountain sites further south, providing a basis for comparison with Hardangervidda and Nordfjella.

In the following, the 11 sites from Hardangervidda and Nordfjella will be presented in detail to establish separate activity phases based on archaeological material and ^{14}C dates (cf. Olsen 2020). The aim is to explore the level of activity before 2350 BC and if there was a

shift in use after the transition to farming. Was there significant activity before this at these types of settlement sites or have they mostly been used in relation to outfield activity (e.g. transhumance or as early shielings)? How does the activity at boulder-shelters and rockshelters compare to the general activity in the mountain areas in the long-term perspective?

The sites

Of the 11 sites, eight was situated in the sub-region Nordfjella (Fig. 1), two in the eastern parts of Hardangervidda and one to the south. The distribution pattern can likely be attributed to a geography with higher peaks and deeper valleys in the north, including more large boulders and glacial deposits in general. The presentation starts with the northern sites moving towards the southern areas. One of the sites was excavated recently (Berg and Olsen 2017) while the remaining ten were examined from the late 1960s and during the 1970s.

In 2016, as part of a field school for master students in archaeology at the University of Bergen, a boulder-shelter (NG II) was excavated at Hallingskeid, Ulvik municipality. The site had a cultural layer with archaeological finds indicating periodical activity from the Late Mesolithic, the Neolithic and the Bronze Age. This was the first boulder-shelter to be investigated in these mountain areas since the 1970s and provided valuable insight into the chronological depth of the activity at many of these sites.

Nedre Grøndalsvatn II (NG II) (Fig. 1, no. 21) was situated c. 988 m.a.s.l. and approximately 100 m east of the lake inlet and c. 10 m above in sloping terrain. The shelter was made from a boulder with an adjacent cleared surface of 15 m^2 (Fig. 2).

***Figure 2**: The site Nedre Grøndalsvatn II. Left: the site during excavation, facing north. Right: plan over the excavated area with cooking pits and surrounding boulders and rock outcrops. Photo and map by author.*

One side of the boulder was slanting providing a roof-like structure with c. 1 meters depth from the dripline, protecting from the elements towards the north. A cultural layer covered most of the site with varying thickness from 5–40 cm of which c. 70% was excavated. At the edge of the cleared surface opposite the boulder, three cooking pits and/or sunken fireplaces was discovered, one of which ^{14}C dated to the Early Iron Age. The cultural layer consisted of two separate phases, the topmost ^{14}C dated to 835–755 BC (UBA-33865, 2600±34 BP) (Late Bronze Age) and the lower half to 5840–5670 BC (UBA-33866, 6865±39 BP) i.e. the Late Mesolithic. The long time span between the radiocarbon dates could be complemented with the activity reflected by the archaeological material. Of a total of 988 lithic finds, of

which 50% flint, 27% quartz and 23% quartzite, most was debris from tool production, but also included arrowheads. Microblades of flint substantiate the oldest radiocarbon date, but transverse and single edged arrowheads indicate activity between c. 4500–3500 BC (Late Mesolithic–Early Neolithic).

Blades from cylindrical cores of flint indicate activity in the Middle Neolithic (c. 3500–2350 BC) as does a fragment of a rhombic arrowhead of slate. Bifacial arrowheads with a straight base were used in the Late Bronze Age (cf. Mjærum 2012), which is consistent with the ^{14}C date of the upper part of the cultural layer.

This site had multiple phases of activity with the oldest in the first half of the Late Mesolithic. The next phase was in the transition between the Late Mesolithic and the Early Neolithic followed by activity in the Middle Neolithic. Then there is a hiatus in the Late Neolithic/ Early Bronze Age with activity again in the Late Bronze Age and Early Iron Age. There were tool production at the site from all activity phases and it is not possible to establish, or discard, increased activity after the transition to farming after 2350 BC.

Øljuvatn heller III and V was situated in the northern part of the Nordfjella sub-region (Fig. 1, no. 8–9) at the far eastern side of the lake Øljuvatn. The two adjacent rockshelters were separated by variation in the cliff overhang and might have been used at the same time. Øljuvatn heller III was ten meters long facing southwest with a circular base. The dripline was seven meters at its highest and the habitable space had a maximum depth of four meters. A total of 30 m2 was excavated (>70%) revealing a cultural layer with three separate phases. The stratigraphy had been disturbed after the original activity, as a concentration of fire-cracked rocks with charcoal in the bottom layer was ^{14}C-dated to the Early Iron Age while another similar structure was radiocarbon dated to 5990–5670 BC (T-3621, 6940±90 BP) e.g. the Late Mesolithic. Lithic material (819) was found throughout the cultural layer with flint as the dominating raw material (c. 67%), with quartzite (18%), quartz (13%) and slate (2%) also represented. Flint was also the primary material used for scrapers and transverse arrowheads. All categories of arrowheads were found in the bottom and presumably oldest stratigraphic layer, which confirms a secondary disturbance of the site. The types include, in addition to transverse arrowheads, single edged, tanged A-points (flakes), rhomboid slate points and bifacial arrowheads. The largest single category is the bifacial type with 63 finds including prefabs and fragments. The majority are later types such as leaf shaped with straight or convex base and the triangular type. Only one of the bifacial arrowheads is of flint and represents an early type from the Late Neolithic, leaf shaped with a concave base (also known as 'heart shaped'). The archaeological material show similar levels of activity from the Late Mesolithic and throughout the Bronze Age including tool production at the site. Considering just the bifacial arrowheads it is possible that the main activity was from the Early Bronze Age and forwards, but interestingly with marginal activity in the Late Neolithic.

The adjacent ***Øljuvatn heller V*** was nine meters long and with a maximum depth of 4.5 m. The height varied from 1–2.5 m in central areas to 15 m at its highest. An area of 13 m^2 (35%) was excavated revealing a cultural layer with several stratigraphic phases. In the bottom layer charcoal from a section was ^{14}C dated to 5920–5485 BC (T-3620, 6790±130 BP), e.g. the first half of the Late Mesolithic, overlapping with the oldest radiocarbon date from ***heller III***. Of 536 lithics the majority was flint (69%) followed by quartzite (25%), quartz (4%) and slate (2%). Microblades were found scattered throughout the site and could represent

activity contemporary with the ^{14}C date. The diagnostic archaeological material consisted of transverse and single edged arrowheads, tanged A-point (flake), rhomboid slate points and bifacial arrowheads. Flint was the primary raw material among the four first types while the bifacial ones were mainly of quartzite. At this site the early types of bifacial arrowhead with concave base was in majority and one could be determined as a triangular type. One of the slate points is a so-called *phyeensilta* that also had an incised furrow lengthwise, a trait specific for the last part of the Middle Neolithic (T.B. Olsen 2009).

This site shows activity from the beginning of the Late Mesolithic and throughout the Neolithic and Bronze Age, and the rockshelters at Øljuvatn was used consistently both before and after the transition to a farm based society.

Skyrvenut V (Fig. 1, no. 5) was situated 200–250 m from the lake Gyrinosvatn, in the eastern part of Nordfjella, and approximately ten meters higher in sloping terrain. The site consisted of a large slanting boulder that gave shelter towards both east and west and the entire estimated activity area was excavated (21 m^2) (Martens and Hagen 1961, p. 31). A cultural layer was detected with a varying thickness of 2–10 cm and the majority of lithic material was found in the western part. A structure interpreted as a fireplace or a cooking pit was identified just outside the dripline, and in the north stretching four meters to the south was a wall made of stones that could possibly have been a windbreak. Charcoal from the main activity area in the west was ^{14}C dated to 5850–5065 BC (T-257, 6550±200 BP) e.g. the first half of the Late Mesolithic. The lithic material (300) was dominated by quartzite (67%) followed by flint (23%) and quartz (10%). A few arrowheads were found at this site, the oldest types being transverse and single edged points of flint, but Neolithic finds also included tanged A-point (blade) of flint and an atypical A-point of quartzite (microblade). In addition two bifacial points of quartzite was found, one leaf shaped with a straight base and the other triangular indicating activity in the Late Bronze Age/Pre Roman Iron Age. Blades and microblades suggest tool production at the site in late Early Neolithic and/or the Middle Neolithic and cores of green quartzite should probably be related to production of bifacial arrowheads. The site had several activity phases, the earliest in the beginning of the Late Mesolithic, then in the Late Mesolithic/Early Neolithic followed by activity in the Middle Neolithic. The last phases were in the Late Bronze Age and Pre Roman Iron Age.

Vestredalsheller I (Fig. 1, no. 18) was situated in the western parts of Nordfjella the lake Vestredal. Beneath an overhanging cliff, two small rooms each approximately 4 m^2 was excavated. The majority of the lithic material was found in the northernmost room at 60–80 cm depth, in a cultural layer with several phases. Charcoal from layer VI at c. 60 cm was ^{14}C dated to 2495–2035 BC (T-696, 3840±90 BP), e.g. the transition between the Middle Neolithic B and the Late Neolithic. The archaeological finds (729) was predominately of quartzite (93%) and the remaining flint (7%). The only arrowheads found was bifacial of the triangular type (the Late Bronze Age and Pre Roman Iron Age) found in layer IV and the majority of the quartzite at the site should be related to tool production in this phase. Flint debitage and a blade could represent activity in the Middle Neolithic and match the radiocarbon date, but the main activity phase at the site was likely in the Late Bronze Age or later.

Further east lay two boulder-shelters, ***Geiteryggheller I and II*** (Fig. 1, no. 19–20) c. 30 m apart in an area with large ice transported boulders. Geiteryggheller I was situated furthest east

and consisted of large boulders to the north and west creating a living space with a 25 m^2 flat floor partly covered with stone tiles. Approximately 25% was excavated and a cultural layer with a possible cooking pit was identified, but with no radiocarbon dates. Of 475 lithic finds, c. 98 % was quartzite (the rest flint) and related to the production of bifacial arrowheads. Several types were identified with varying chronological significance, with the oldest from the Late Neolithic/Early Bronze Age. Leaf shaped with straight or convex base and triangular arrowheads from the Late Bronze Age and Pre Roman Iron Age shows activity throughout the later parts of the stone using periods, and with few indicators from earlier periods.

The ***Geiteryggheller II*** site was also made up by large boulders around a flat surface of c. 30 m^2. The entire site was excavated and charcoal from a cultural layer was radiocarbon dated to the Early Iron Age. The lithic material (5912) was predominately of quartzite (98%) and is similarly to Geiteryggheller I from the production of bifacial arrowheads. The earliest indicator of activity is a transverse arrowhead from Late Mesolithic/Early Neolithic and fragments of rhomboid slate points from Early Neolithic/Middle Neolithic. The majority of the archaeological material is from Late Bronze Age/Pre Roman Iron Age (triangular and leaf shaped with straight/convex base), but there was also points from Late Neolithic/Early Bronze Age. The two rockshelters at Geiteryggheller were both predominately used from the Late Neolithic and through the Pre Roman Iron Age, after the transition to a farm based society.

The last site from the Nordfjella region is ***Sandå I*** (Fig. 1, no. 22) at the northern end of the Lake Finsevatnet, just north of the Hardangerjøkulen glacier. Sandå I was a small site of 3 m^2 adjacent to a low rock outcrop and a boulder. The site was fully excavated with 98 lithic finds of which 70% quartz, 24% flint and the rest slate. Diagnostic material includes transverse arrowheads, tanged A-points of blades and fragments of rhombic slate arrowheads and points to activity from the last part of the Late Mesolithic and in the Early and Middle Neolithic. Interestingly there were no indications of bifacial tool production or any activity after the Middle Neolithic.

Two boulder-shelters have been analysed from Mår in the southwestern part of the Østvidda sub-region. ***1106 Mår*** (Fig. 1, no. 53) was a site with two large boulders shielding a 20 m^2 flat surface. A cultural layer has been ^{14}C dated to the Middle Age. A trench was dug from the site thorough a waste deposit towards the adjacent rockshelter 1058 Mår. Charcoal from the bottom layer was radiocarbon dated to 1565–815 BC (T-1450, 2980±170 BP), e.g. Early to Late Bronze Age. The site showed signs of secondary disturbances and various types of arrowheads were found without stratigraphical order. Of 1481 lithic finds, 65 % was of flint and the rest quartzite. The main parts of the finds are linked to bifacial technology with arrowheads from the last part of the Early Bronze Age and throughout the Pre Roman Iron Age (leaf shaped with straight/convex base and triangular). There was also a conical core and blades/microblades from activity in the Middle Mesolithic and/or the early parts of the Late Mesolithic, but the main activity phases were likely after 2350 BC.

The site ***1058 Mår*** (Fig. 1, no. 51) had an estimated activity area of 12 m^2 delimited by two large boulders in the west and to the south. The entire surface was excavated (19 m^2) revealing a cultural layer which had been disturbed and multiple concentrations of charcoal and pits were identified, some interpreted as possible fireplaces. A ^{14}C analysis of charcoal from a fireplace gave the date 835–190 BC (T-1452, 2420±140 BP), Late Bronze Age/Pre Roman Iron Age. The bottom of the cultural layer was radiocarbon dated to 2485–1980 BC (T-1445, 3810±90

BP), Middle Neolithic B/Late Neolithic. Burned fragments of bone from the cultural layer and the fireplaces have been identified as mainly reindeer with some evidence of fowl and fish. Of 2775 lithics, 83% was quartzite and the remaining of flint. Diagnostic material includes 25 arrowheads: a transverse and a tanged A-point (blade) and 23 bifacial. The latter consist of four different types: leaf shaped with concave (Late Neolithic/Early Bronze Age), straight and convex (Late Bronze Age) and triangular (Pre Roman Iron Age). Blades and microblades found throughout the stratigraphy should be linked to activity in the late Mesolithic and/or Neolithic. The majority of the bifacial arrowheads were made of quartzite and the main activity phases at the site were likely from the Late Neolithic/Early Bronze Age and on.

Only one rockshelter is known in the sub-region Sørvidda and the site was situated 150 m from and 10 m above the lake Bordalsvatnet.

Bordalshelleren (Fig. 1, no. 76) was formed by an overhanging cliff with a dripline as high as 6–8 m. Approximately 70% of the site was excavated (18 m^2) revealing a cultural layer without any structures. Lithic material was found scattered in all stratigraphical layers indicating later disturbances. Charcoal was radiocarbon dated to 380 BC–73 AD (T-217, 2100±100 BP), Pre Roman Iron Age/Early Iron Age. The archaeological material consisted of 643 lithics of which 86% quartzite, 12% flint and 2% quartz. Diagnostic material was seven bifacial arrowheads of quartzite; six leaf shaped with convex base and a triangular type. The arrowheads were used between the Late Bronze Age and the first half of Pre Roman Iron Age (c. 800–200 BC). Some blades and microblades of quartz and quartzite indicate activity possibly from the Mesolithic, but the main activity phase of this site was from the Late Bronze Age and on.

The presentation of these eleven boulder- and rockshelters clearly shows variation in terms of long-term or short-term occupation and the degree of activity before and after 2350 BC. These types of settlement sites will be discussed further in light of recent research and as part of the general settlement pattern of the mountain areas.

The shelters – long-term use?

Long-term activity at Hardangervidda and Nordfjella

Rockshelters and boulder-shelters are relatively rare compared to open-air sites, which could be placed almost anywhere. In order to use the shelters one would have to accept the placing in the terrain and landscape. Varying preferences is a factor that could have influenced the use of rockshelters and should be included when considering changing trends in activity over time.

Data from the investigated sites at Hardangervidda and Nordfjella provides a basis for discussing the use of these types of permanent settlement structures. Looking at the radiocarbon dates from the sites (Figure 3) it seems that the main activity as recorded by ^{14}C dates was from the Middle Neolithic B/Late Neolithic transition and on. Before this, there is a hiatus with no activity from the end of the Late Mesolithic and in the Early Neolithic/Middle Neolithic. The majority of the activity according to ^{14}C dates was after c. 1000 BC (Late Bronze Age/Pre Roman Iron Age) and an interesting question is how the archaeological material relates to this trend.

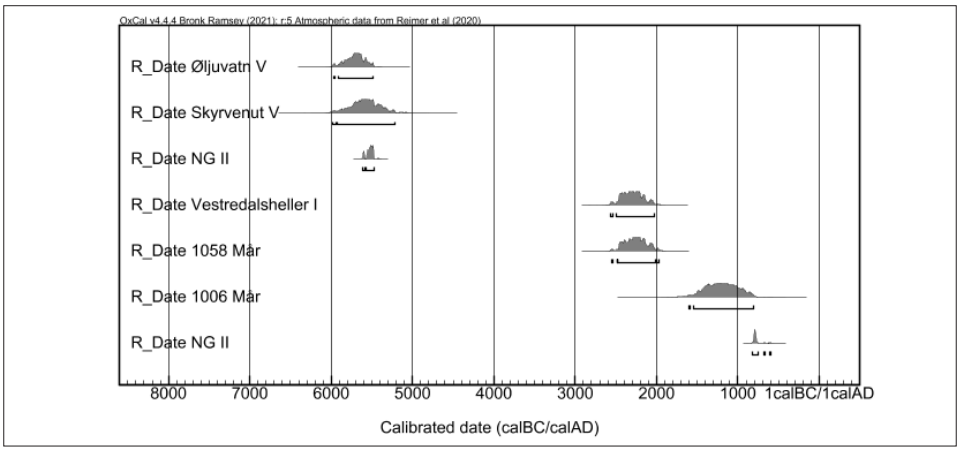

***Figure 3**: Multiple plot of the radiocarbon dates from periods using lithic technology (>ca. 200 BC).*

The lithic material from the sites can mostly be used for a low-level chronology to show the activity over time. It will however indicate certain trends, and together with the radiocarbon dates, it gives us an insight into the relative importance of these types of sites. The arrowheads, raw material and technological traits can be used as markers to establish activity within chronological phases. Here all finds are equal and do not factor the degree of activity in terms of intensity as might be reflected in the number of finds. It is however clear from the review of the sites that the activity is evenly distributed before and after 2350 BC and that for most situations the lithics represents more than one isolated visit. The chronological activity phases reflects the general use of rockshelters, and can be compared with other indications of mountain activity. The phases vary in duration between 1000–1300 years due to the long continuity of the various arrowhead technologies.

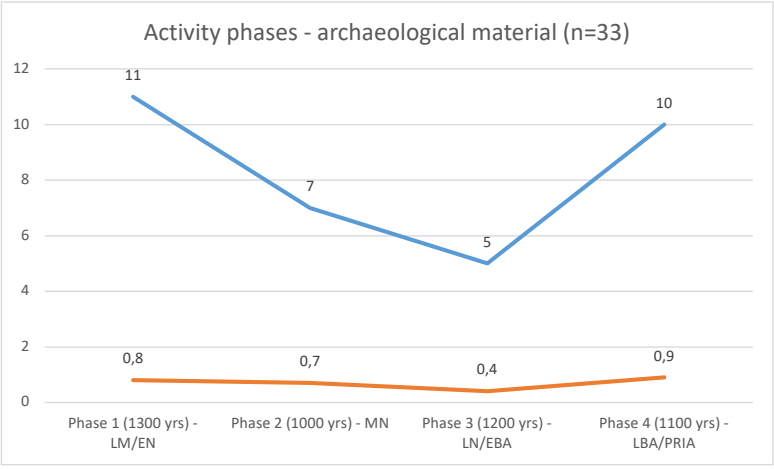

***Figure 4**: Diagram of activity phases based on chronological dating of lithic artefacts and technological traits. The top line shows number of individual activity phases at the rock shelters within each chronological phase. The bottom line shows the number of activity phases pr. 100 years.*

In Figure 4, 33 different activity phases from the eleven rockshelters are distributed within four main chronological phases. The timeline starts at c. 4500 BC (the Late Mesolithic phase 4) and ends c. 200 BC based on the presence of lithic material. The diagram shows some variation in activity with similar levels at the beginning and the end with a gradual decrease towards the transition to the LN/EBA. The dataset is limited and does not say if the change is gradual or stretched over long periods. When comparing this analysis with the multiple plot of ^{14}C dates, it is clear that they complement each other providing a fuller picture of the use of these settlement structures. The radiocarbon dates (mentioned in the text) show a lacuna in the Late Mesolithic – Middle Neolithic and with the main activity after c. 1000 BC at the transition to the Late Bronze Age. The activity phases also show a rise in activity in the Late Bronze Age and Pre Roman Iron Age and substantiate the ^{14}C trends. The lacuna is however not real when including the archaeological material. The trend is rather the opposite with relative high activity at least from the Late Mesolithic, providing a better understanding of the activity in general.

The activity at the sites at Hardangervidda and Nordfjella fits with the above-mentioned studies of rockshelters elsewhere, suggesting that the sites have been in use and seen as 'attractive' throughout the Neolithic and in the Early Bronze Age and that hunting and fishing was the primary focus. In the following, the shelters will be discussed in light of the general settlement pattern at Hardangervidda and Nordfjella to see if this particular settlement type differed from open-air sites.

Rockshelters and boulder-shelters as part of the general settlement pattern

The use of rockshelters must also be discussed in light of the general activity and settlement pattern in the mountain areas. The majority of the sites were open-air used seasonally for hunting reindeer. This also applies for the activity in the Late Neolithic and the Early Bronze Age, although the degree of transhumance and the use of mountain areas as pasture is an uncertain factor (Indrelid and Moe 1982, Kvamme *et al.* 1992, Indrelid 1994, p. 233–234, Eide *et al*. 2006). Figure 1 shows the general dispersal of sites and the activity has shown similar variation to the use of rockshelters. Looking at the ^{14}C dates from the analysed sites at Hardangervidda and Nordfjella a few trends can be discerned.

The first is an increase in radiocarbon dates in the Early Neolithic that started already in the last part of the Late Mesolithic. This was followed by a drop towards the beginning of the Middle Neolithic. Then there was a new increase with a peak in the last part of the Middle Neolithic (B) before a new low in numbers in the first part of the Late Neolithic. In the last part of the Late Neolithic, there was another rise with a new drop in the Early Bronze Age.

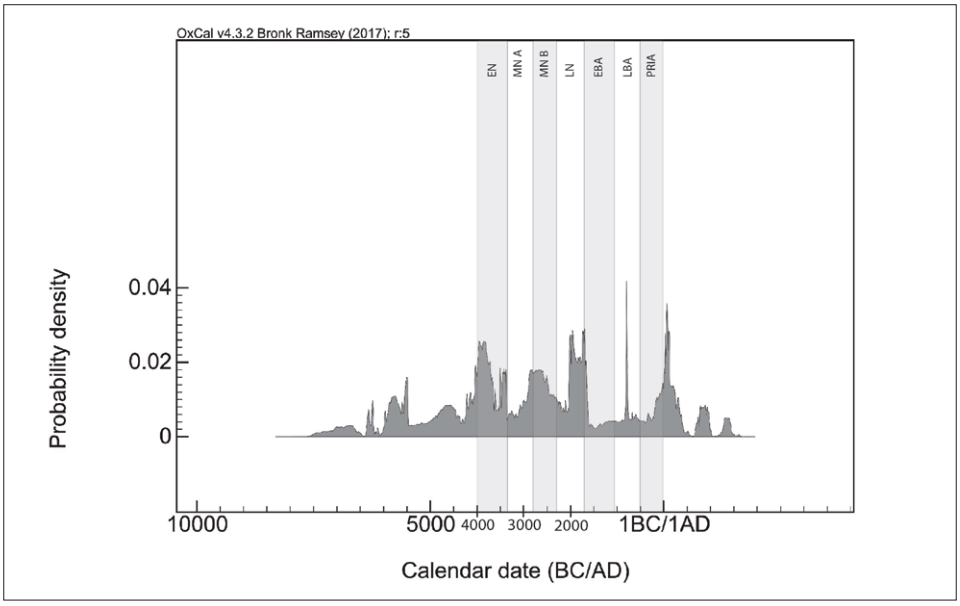

***Figure 5**: Summed probability curve for radiocarbon dates from sites in the study area (n=70).*

Placing the combined indications of rockshelter activity within this context it is clear that they overlap and show similar trends. The general activity shows a variation with highs and lows in the Neolithic and the Bronze Age, and is further corroborated by the activity as reflected by the archaeological material (Olsen 2020, p. 348–349). A prominent trait in the long-term demographic trajectory for the study area was the decline in activity during the first half of the Late Neolithic indicated by both the ^{14}C dates and the archaeological material (e.g. Olsen 2020, p. 358ff). This can also be seen at the rockshelters where few sites contain the earliest types of bifacial arrowheads but show an increase in the Bronze Age material. In addition, a high level of activity in the Late Mesolithic and the Early Neolithic is also comparable and the analysis clearly suggests that the activity at the rockshelters does not differ from the general historical trajectory for the mountain areas. Ten of the rockshelters have been interpreted as mountain base camps and one (Sandå 1) as a specialized activity area. This applies for all the different activity phases indicating that this type of shelter have been considered interesting for long periods. This also transcends the division between hunter-gatherer and agricultural based societies, at least throughout the Bronze Age. This should not come as a surprise as naturally occurring permanent shelters are scarce and it seems that the location of the sites, often farther away from bodies of water than open-air sites, did not influence or restrict the use. There is also no clear difference in the use of the two types of shelters as people seem to have used what was available to in the area they were active.

A challenge when compiling various data from the sites is how to weight different indicators of activity. Several sites have ^{14}C dates from the first half of the Late Mesolithic, a period without arrowhead technology as a defining chronological marker. As a contrast, many of the sites have bifacial technology present giving an impression of more activity from the Late Neolithic and on. Most sites have Mesolithic blades, microblades and debitage but this is often

undercommunicated, as the material is hard to use chronologically without a technological study. In their review of Mesolithic rockshelters and caves from coastal and inland areas in western Norway, Bergsvik and Storvik (2012) show that many of these dwellings were used throughout the Middle and Late Mesolithic (c. 8000–4000 BC) with varying intensity and occupation length. In this study the relatively small caves and rockshelters was interpreted as less important to the groups compared to the much larger open-air sites in the region (Bergsvik and Storvik 2012, p. 33). This might in part be because in the Late Mesolithic people became more sedentary occupying the same space over longer periods, demanding larger areas than available in the rockshelters and caves. This is not relevant when analysing the sites in the mountain areas since the occupation was short term with smaller groups of hunters. The rockshelters was part of the overall settlement system with base camps and specialized activity areas, mainly relating to the first type even if the stay was only for a few days or a week. There is also a point to be made regarding the mountain sites where the potential numbers of rockshelters probably were fewer than in lower lying regions, and that the permanent dwellings was of general interest.

The use of the high mountain areas was also influenced by general demographic trends in South Norway where highs and lows can be seen in the proxy data for population variation (Nielsen *et al.* 2019). Climatic variation during the Holocene also had an impact on the activity and one notable trend was a temperature decline after 3200 BC leading to a lower forest line and a glacial expansion (e.g. Bakke *et al.* 2005, Bakke *et al.* 2008, Gjerde *et al.* 2016, Olsen 2020, p. 76ff). An effect was that the study area became mostly deforested leading to larger pastures for reindeers and bigger herds. This in turn led to an increase in activity by groups both from eastern and western Norway with higher level of contact and cultural exchange. In contrast, there was a population decline between 2500–2100 BC (Nielsen *et al.*, 2019) leading to a change in settlement patterns and possibly less activity in the mountains. This might also be connected to less focus on these areas during a time of large-scale societal changes in the first half of the Late Neolithic (Olsen 2020, p. 416ff, Solheim 2021). This changed during the Early Bronze Age when mountain resources gained an increasing importance (Prescott and Melheim 2017).

Conclusion

The analysis of the rockshelters from Hardangervidda and Nordfjella show that there is little basis for arguing increased importance in early agricultural based societies. The material from the sites clearly demonstrates that permanent shelters has always been used and most frequently in a base camp capacity. The use also corresponds with the general settlement pattern and follows the general variation in activity at the Hardangervidda and Nordfjella mountain range. It seems that decent habitation sites have been attractive for both hunter-gatherer groups and agriculturalists, regardless of the sites location in the landscape.

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In this volume, 10 papers from the Stone Age Conference in Bergen 2017 are presented. They range thematically from the earliest pioneer phase in the Mesolithic to the Neolithic and Bronze Age in the high mountains. The papers discuss new research and methodological developments showing a diverse and dynamic Stone Age research community in Norway.

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