2.7.1. SAGENE B2 – REPEATED EARLY MESOLITHIC OCCUPATIONS AND A BRONZE AGE COOKING PIT

Sagene B2 was situated on the west side of an esker, and contained two concentrations of Early Mesolithic finds at elevations of between 55 and 57 m.a.s.l. During the Early Mesolitihic, the site would have been overlooking a sound, connecting the open sea to the east with an inner archipelago to the west. The shoreline displacement curve, in connection with the find material, indicates a use phase between 9200 and 8800 cal. BC.

At Sagene B2, a total of 6786 finds were collected. These come from two spatially discrete concentrations: one northern, smaller concentration with finds distributed over an area of approximately 15 m^2, and one southern, more elevated, concentration of *c.* 30 m^2. The latter is also more abundant in finds. The assemblage is heavily dominated by flint in both concentrations, with only marginal use of quartz and rock crystal. Both concentrations are very similar in their composition, and are especially noteworthy due to a high frequency of arrowheads and fragments of such. Tanged, single-edged and Høgnipen varieties are all present, but with the latter category being present in comparatively small numbers. Other tools than arrowheads, such as scrapers, burins or knives are relatively scarce and it is argued that the concentrations represent short-term camps, connected to hunting. It has also been suggested that the concentrations have not been used simultaneously, but are the result of repeated visits to the area.

A number of anomalies, especially in connection to the southern concentration, were investigated as possible structures, but were eventually ascribed to a tree throw event, which has severely compromised the find distribution, both horizontally and vertically. Thus no features can be put in connection to the Early Mesolithic use of the site. However, a cooking pit, and an associated refuse layer of fire-cracked rock, demonstrate a use of the area during the Late Bronze Age.

2.7.2. SAGENE B4 AND B6 - TWO EARLY MESOLITHIC SETTLEMENT SITES IN A BAY

Sagene B4 and Sagene B6 were located on the west and east side of a gorge, at elevations of 54 and 50 metres respectively above present sea level, and at a distance of *c.* 100 metres from each other. This gorge formed a narrow bay/fjord during the Early Mesolithic, until *c.* 8500 cal. BC, at which point land rise processes deprived the area of its connection with the sea.

The investigation of Sagene B4 yielded an assemblage of 853 lithic finds in total. These come from three different concentrations situated on a saddle landform delimited to *c.* 90 m^2 by bare rock. The material is heavily dominated by flint (98 %), with a small portion of quartz and rock crystal. The technology evidenced through both the blades and cores left at the site is of an Early Mesolithic character, and possibly focused on the production of narrow blades from good quality flint. A few microburins and lanceolate microliths were found, but arrowheads are few, in view of how ubiquitous they tend to be at Early Mesolithic sites. The opposite is true for the number of scrapers and scraper fragments at Sagene B4, which is argued to be unusually high. The numerous scrapers lend support to the suggestion that Sagene B4 may have been a special purpose site focused on hide preparation. The lack of structures, the small number of finds and the rapidly changing landscape, invites us to see it as a short-term site around 9000 cal. BC.

Sagene B6, which is argued to be slightly younger than Sagene B4 and in use around 8900 cal. BC, is similar to Sagene B4 in terms of lack of structures and general reliance on blades from unifacial blade cores. The find assemblage from Sagene B6 is larger, 1600 finds in total, and emanates from a single find concentration, which is not as dominated by flint as at Sagene B4. The flint is also more often of a coarser variety, indicating less access to high quality raw material sources, something which is also substantiated by an increased proportion of quartz and rock crystal (24 %). The latter raw materials are worked in a manner similar to that of flint, *i.e.* for blade production. Arrowheads of the "Høgnipen" variety, but also including tanged arrowheads, dominate the tool inventory at the site.

The sites Sagene B4 and Sagene B6 provide substantial evidence that can throw light on possible changes occurring within the Early Mesolithic of Southern Norway in that they have been recovered to a high degree, are reasonably well preserved, are arguably free from later lithic production debris and are of a varied character.

2.7.3. SAGENE B1 – AN EARLY MESOLITHIC BASE CAMP WITH A DWELLING STRUCTURE

Sagene B1 was located 48–50 m.a.s.l. on an isthmus between two hills to the west and east. The terrain dropped abruptly at the northern end of the site. At the southern end of the site, the terrain sloped downwards. A small flint concentration was located on a ledge on the western hill, 53–54 m.a.s.l. At the time of occupation, the site had a sheltered position on a ness. The northeastern part of the ness looked onto a sound and the northern end of the site faced a fjord basin. The site was ideally positioned with two landing spots when the sea level was 47 meters higher than today, around 8800 BC (fig. 2.2.3.1).

The excavation unearthed two hearths, three postholes and a stone-packing (figs. 2.2.3.3 and 2.2.3.4). The hearths were visible as assemblages of stones, some of which were fire-cracked. The stone-packing covered an area of 8.8 m^2, and consisted of smaller stones between larger earthbound stones. The smaller stones showed traces of heating, and a find concentration correlated to the limits of the structure. Structural elements were uncovered just south of the stone-packing: three circular formations of stones interpreted as postholes. The postholes and the stone-packing are interpreted as the remains of a cobble floor from a dwelling structure.

A total of 12,673 lithic finds of quartz (57 %), flint (42 %), rock crystal (0.3 %) and other worked rock types (0.6 %) were recorded (figs. 2.2.3.6–2.2.3.14). The quartz cores and debitage display technological similarities to the flint material, in the form of blade production from one-sided cores. As only eight finds of quartz are retouched, quartz flakes and blades were primarily used as edges and tools without modification. Two tanged arrowheads are among the quartz tools. Formal flint tools and debris include flake axes, tanged arrowheads, lanceolate microliths, burins, scrapers, microburins and one-sided cores. Blades constitute nearly 20 % of the flint material, and demonstrate a high degree of morphological variation. The rock crystal finds are debris from the reduction of one or a few crystals. A bipolar core and a retouched blade are among these finds. An axe and axe-related flakes of metarhyolite represent a large portion of the finds of other rock types.

The collected material from Sagene B1 is typologically dated to the Early Mesolithic (*cf.* Bjerck 2008b; Jaksland 2014; Damlien 2016). Uniformity in the lithic material throughout the Early Mesolithic period makes a more precise dating of the lithic finds difficult. However, recent studies have shown that some trends in the Early Mesolithic material culture could be of chronological significance. By studying projectiles from Early Mesolithic sites from the *E18 Brunlanes project*, Jaksland and Fossum (2014) have observed that single-edged points steadily decrease in number during the period. At the same time, *Høg*nipen arrowheads and lanceolate microliths increase in number. Based on Jaksland and Fossum's study, the transition from single-edged points to *Høg*nipen points and lanceolate microliths could have been completed before Sagene B1 was occupied around 8800 BC (*cf.* Darmark & Viken, chapter 3.8, this volume). Axe production in metarhyolite is also known from Early Mesolithic sites further east in Norway (Jaksland 2012a, 2012b; Fossum 2014a; Eymundsson *et al.* 2017). Altogether, the lithic material and the shoreline dating correspond to a dating of Sagene B1 to the Early Mesolithic, around 8800–8700 BC.

Five collected charcoal samples from Sagene B1 were radiocarbon dated (table 2.2.3.26): one sample from the stone construction, three samples from the postholes and one sample from one of the hearths. No charcoal was visible in the features, probably due to rainfall and podsolization (*cf.* Rankama 2004: 60). In some instances, the washed down charcoal was visible as a grey colouration of the soil beneath the features. Therefore, large soil samples were collected from the profiles in order to extract coal. The datings are scattered and disassociated from the lithic material; the dated charcoal is interpreted as remains from forest fires in the area. A recent environmental study (Ohlson *et al.* 2009) has shown that Southeast Norway is a region especially affected by forest fires. In addition, the study showed that charcoal deteriorates much faster than previously thought; the charcoal sampled in the study proved to have a median age of *c.* 650 years. This implies that Early Mesolithic charcoal will be heavily deteriorated and almost non-existent on sites located

in Norwegian forests. This is in line with results from other Early Mesolithic sites in Eastern Norway and Western Sweden with C14-datings comparable to the ones from Sagene B1 (Schmitt *et al*. 2009: 2; Jaksland 2014: 28–33; Solheim 2017).

Both hearths at Sagene B1 were located in distinct find concentrations. This is typical for Early Mesolithic sites in Southern Norway (Bjerck 2008a: 223, 2008b: 559–561; Jaksland 2014: 26; Breivik & Callanan 2016). The cobble floor should also be seen in context with the find distribution connected with it, and the postholes can only be understood as parts of this dwelling structure. The cobble floor has parallels in structures at the Early Mesolithic *Site 72* at the *Ormen Lange Nyhamna project* in Møre and Romsdal county (Bjerck 2008c). This leads to an interpretation of the features at Sagene B1 as contemporaneous with the lithic material.

The find distribution shows several distinct concentrations along the isthmus. To ease the analytical work, the site was divided into seven areas based on the find distribution, designated *Areas A–G*. Formal tools and knapping debris were present in all areas, but, on a more detailed level, certain traits were distinguishable. The largest concentrations in Area B, C, E and F are of approximately the same size and composition, and can represent four contemporaneous households (*cf*. Bjerck 2008b). The cobble floor and the postholes in Area B covered an area of approximately 10 m^2, with a distinct find concentration related to the cobble floor. A cluster of heated flints shows a centrally placed hearth in the structure. The hearths in the find concentrations in Area C and E, and a cluster of heated flints in the find concentration in Area F, might indicate the location of additional dwellings with hearths. If one assumes that several visits at the same site would result in overlapping find concentrations, as one does not knap or put up a dwelling structure in the exact same spot each time, the find distribution at Sagene B1 could be the result of a single occupation by up to four households. Evidence of unskilled flint knapping in the form of cores with stacked hinges, bad striking-angles and rounded shape from Area A, C and E, and two secondarily modified flake axes from Area F with hinges, obtuse striking-angles and an unsymmetrical end result, contribute to our understanding of these households. Flint knapping was a necessary skill for people using flint for a wide range of tools, and the presence of unskilled knappers suggests that children were a part of three of the households (*cf*. Viken & Darmark, chapter 3.7, this volume).

The smaller find concentrations and Area A and G are primarily knapping areas. Area D, located centrally between the four households, has a different compilation of finds, traces of fewer knapping situations and lacks a distinct find concentration. This could be a collective area on the site, where activities less distinguishable in the lithic material have taken place.

Remarkably, tanged arrowheads (including single-edged points) only occurred in Area C and D, while *Høgnipen* arrowheads occurred in Area E and F (with one exception found in Area D). As projectiles, the *Høgnipen* points are well suited to penetrate prey, but they lack a cutting edge. In addition, the arrow shaft would have been broader than the arrowhead. A lateral element could have been necessary for the arrow to make a deep, bleeding wound (*cf*. Yaroshevich *et al*. 2013: 3). Lanceolate microliths placed in the side of the arrow shaft would make the arrows more effective. Lanceolate microliths occurred in Areas B–F, and could also have been used in combination with the smaller tanged arrowheads (*cf*. Darmark & Viken, chapter 3.8, this volume). If so, the distribution of tanged vs. *Høgnipen* points could reflect individual preferences in arrow design. However, as *Høgnipen* points increase in number towards the late Early Mesolithic, other factors could be in play. Blades, flakes and fragments served as blanks for *Høgnipen* points, while blades were preferred for production of tanged arrowheads. Therefore, increased use of *Høgnipen* points could be a response to a situation where there was less available raw material, *i.e*. flint. Breivik (2014) has investigated Early Mesolithic human adaptation to the marine environment along the Norwegian coast. She has shown that a warmer climate gradually developed after 8800 BC; the Gulf Stream stabilized, the fjords became ice-free and the coastal fauna diversified. These conditions made the Norwegian coast attractive throughout large parts of the year, and could have laid the foundation for stays of longer duration in the time after 8800 BC. If people stayed longer along the Norwegian coast, shortages of raw materials could occur, as they were not able to collect high quality flint in flint-rich areas as often as before. In this situation, a new type of raw material-conserving projectile could be attractive. Another possibility is that tanged arrowheads and *Høgnipen* arrowheads were used in different hunting strategies in a time with great faunal diversity along the Norwegian coast.

The appliance of flint technology on quartz, in the form of blade production from one-sided cores, raises further questions regarding raw material strategies. Quartz blade production is not as frequent on younger sites from the project, where bipolar reduction of quartz is far more common (*e.g*. Viken, chapter 2.3.2, this

volume). This might indicate that quartz reduction was a relatively new strategy, or that the technology was restricted by tradition or social mechanisms (*cf.* Akerman 2006; Rankama *et al.* 2006; Knutsson *et al.* 2017). In addition, two tanged arrowheads in quartz were found in the same areas as the tanged arrowheads in flint. Albeit, considering the extensive quartz assembly, the two arrowheads show that the use of quartz projectiles was not a widespread phenomenon in the Early Mesolithic in this region. In this context, the tanged arrowheads could be the result of experimentation to determine which tools quartz was best suited for. Alternatively, unskilled knappers practising flint technology might have used quartz, as this was a local, abundant raw material (see discussion in Eigeland 2015: 193–194; Viken & Darmark, chapter 3.7, this volume).

The shoreline displacement curve and the local topography demonstrate that the site was shore-bound only for a short period of time: from the moment when the site became dry land, the ocean withdrew rapidly. Around 8600 BC Sagene B1 was located 10 m.a.s.l., without natural harbours close by. This, seen in connection with the find distribution, leads to an interpretation of the site as the remains of one occupation by four households. At the same time, the presence of unskilled flint knapping suggests that children were a part of the households. This makes the site unique compared to the other Early Mesolithic sites excavated within the *E18 Tvedestrand-Arendal project*. The other sites have episodic characteristics with fewer finds distributed in one or two find concentrations, few or no distinguishable features and seem to be specialized towards hunting and/or retooling (*cf.* Darmark, chapters 2.2.1, 2.2.2 and 2.2.4, this volume; Darmark *et al.*, chapter 2.2.6, this volume 2.2.6; Stokke *et al.*, chapter 2.2.5, this volume; Stokke & Reitan, chapter 2.5.5, this volume; Viken, chapters 2.2.7 and 3.5, this volume). It is challenging to estimate the duration of the occupation at Sagene B1 on the basis of lithic materials, but well-preserved features and the conjectured presence of children in the households suggest that this was a base camp where the family groups could stay while smaller task groups went out on hunting and fishing expeditions.

2.7.4. KVASTAD A9 – AN EARLY MESOLITHIC HEARTH-CENTERED ACTIVITY AREA WITH TRACES OF LATER VISITS AND NATURAL FORMATION PROCESSES

Kvastad A9 was situated between 54 and 55 metres above present sea level on the west side of an esker. A small concentration of mainly flint finds, covering no more than 7 m^2, was recovered at the site, located centrally on a sheltered plateau defined by very fine sand, virtually free from stones. The 205 finds include large blades from cores with opposed platforms and tanged arrowheads made from blades, consistent with the view of the site being used during an Early Mesolithic, shore-bound phase. Starting from 8700 cal. BC, the site would have been placed on the tip of a promontory, overlooking the inlet to a system of fjords to the west and with easy access to the open sea in the east.

The collected finds were located in close connection to a conspicuous concentration of fist-sized stones (Feature 4), which is argued to either constitute the remains of a hearth or cached boiling stones. The absence of coal, soot stains or burnt flint would point to the latter. Similar structured hearths are, however, known from other regions, where they are associated with darkened soil, and it is possible that the pedological processes at Kvastad A9 have obliterated any charcoal originally deposited. This phenomenon is evidenced by several diffuse pit features that were excavated at Kvastad A9. These were characterized by subtle rings of reddened sand and were, in the end, seen as the result of tree throws. The relative absence of organic material in these pits is seen as evidence of a rapid podsolization at the site, which would have affected cultural features as well. It is likely that the tree throws are responsible for redistribution of the Early Mesolithic find material. Other possible disturbances include several later visits to the site, which have left features dated to the Middle Mesolithic (7185–7044 cal. BC) and Late Bronze Age/Early Iron Age (771–435 cal. BC). A sample from the soil underneath the stones in Feature 4 was radiocarbon dated to the Early Bronze Age (1506–1414 cal. BC), but this is seen as a later intrusion of coal.

In spite of these disturbances, the recovered find material, clearly associated with Feature 4, is seen as an interesting assemblage. This is especially so when compared to other contemporary sites excavated within the project. The site seems to have been used during an extremely short time period and as such puts the traditional view of single episode sites into question.

2.7.5. KVASTAD A1 – A SHORT-TERM EARLY MESOLITHIC SITE WITH TRACES OF RE-TOOLING

Kvastad A1 was located on a large easterly promontory, overlooking what was a sheltered, shallow inlet in the last part of the Early Mesolithic. Whereas the survey conducted by the county council indicated that artefacts were scattered over the entire area, the initial phase of the excavation proved the finds to be concentrated in two distinct, small areas *c.* 25 metres apart; one northerly and one southerly, designated Kvastad A1 north and Kvastad A1 south, respectively.

The cluster at Kvastad A1 north measured 5 x 5 metres. The excavation in this area yielded 926 lithic finds, of which 93 % are flints, almost all of which are burnt. The assemblage includes debitage from chisel or axe production or reduction, as well as lanceolate microliths, Høgnipen-, and tanged points, and three microburins. There were no traces of earthdug features.

The concentration of finds at Kvastad A1 south was located on a slope and measured 7 x 7 metres. 1183 lithic finds were collected, of which 99 % are of flint, virtually all of which are burnt. This cluster, too, included flake chisel or axe production waste, lanceolate microliths, Høgnipen-, and single-edged points, as well as a single microburin. In addition, a complete, but heavily burnt flint flake chisel was found. All of the finds were centred on a fireplace containing 100 litres of fire-cracked rocks, but very few finds.

Both areas of Kvastad A1 also contained a considerable number of blades and microblades. The blade material exhibits traces of being produced using medium hard direct technique, and possibly direct soft hammer.

The activities in the slope at Kvastad A1 south seem to be very much concentrated around the hearth A1108, and a charcoal sample collected from a test pit from the same slope during the county council's survey provided a date to the late Early Mesolithic, 8471–8280 BC (9150 ± 40 BP, Beta-366066). However, multiple charcoal samples collected from the hearth during the subsequent excavation were dated to the Late Bronze Age/Pre-Roman Iron Age transition and the Pre-Roman Iron Age (*c.* 700–100 BC). It is argued that due to the rate of decomposition of charcoal and the contamination caused by frequent forest fires in the region, sampling should perhaps focus on the poorest preserved charcoal.

Typologically the finds from both parts of the site point to a late Early Mesolithic date. The local shoreline displacement curve supports this, as does the date-result obtained from the survey. The site is interpreted as a re-tooling site and is probably to be seen in relation to other contemporaneous sites in the vicinity.

2.7.6. KVASTAD A4 – AN EARLY MESOLITHIC SITE

At the time of excavation Kvastad A4 was located 52–58 m.a.s.l. The site was sheltered by rising terrain to the northwest. At the time of occupation (*c.* 8500–8300 cal. BC) the site was situated on an east-facing, gently sloping promontory by a bay in a fjord (fig. 2.2.6.1).

The finds at Kvastad A4 were concentrated on the eastern part of the site (fig. 2.2.6.2). This area is interpreted as the central activity area on site. Two hearths and a cooking pit were uncovered in this area, but charcoal samples from these yielded results that indicate much later use of the site: one sample was dated to the Late Bronze Age/Early Iron Age transition, another to the Early Iron Age, and the third to the Late Iron Age (table 2.2.6.11). At the western part of the site, a quartz vein was investigated. However, this investigation gave no convincing evidence of prehistoric quarrying (*cf.* Storemyr 2015).

A total of 13,021 lithic finds were recorded, out of which 8691 were collected during the investigation of the quartz vein. These finds will not be presented here. In the central activity area at the eastern part of the site, 4330 lithic finds of flint (57.1 %), quartz (40.6 %), rock crystal (2.1 %) and other rock types (0.3 %) were recorded (table 2.2.6.5). Formal flint tools and *débitage* from this area include flake axes, tanged points, lanceolate microliths, one-sided cores, bipolar cores, blades and microblades. Cores, flakes and blades are among the quartz finds. Bipolar cores, blades and a retouched fragment are among the rock crystal finds. The finds of other rock types are hammer stones and a grinding stone. Selected finds are illustrated in figures 2.2.6.6–2.2.6.9. Based on the lithic finds and the local shoreline displacement curve, the site is dated to the latter part of the Early Mesolithic, *c.* 8500–8300 cal. BC (see *e.g.* Jaksland 2014; Damlien 2016; *cf.* Romundset, chapter 3.2, this volume).

A total of six charcoal samples from Kvastad A4 were radiocarbon dated (see table 2.2.6.11): four samples from the two hearths and the cooking pit in addition to two samples from the trench excavated in connection to the quartz vein. The radiocarbon dates are not consistent with the shoreline displacement dating or the lithic finds, but could reflect activities on the site during the Iron Age.

Within the central activity area, five smaller find concentrations were documented (fig. 2.2.6.12 and fig. 2.2.6.13). These have been termed *find concentrations 1–5*. Flint is the dominating raw material in the find concentrations 1, 2 and 5, while quartz is the dominating raw material from the find concentrations 3 and -4.

Find concentration 1 is the most comprehensive of the five clusters on the site. Finds of flint and quartz have a similar distribution within this area. The majority of the formal flint tools recorded at Kvastad A4, too, was unearthed in this area, including one flake axe and several arrowheads (fig. 2.2.6.14). None of the quartz finds from the same area have been secondarily modified. Find concentration 5 exhibits a find composition similar to that from find concentration 1, but the finds from find concentration 5 are almost exclusively flints. The lithic finds indicate that tools have been produced, used and maintained in both these areas.

The find concentrations 2, 3 and 4 contained few formal tools, and might represent knapping areas or toss zones for flint and quartz.

The finds from the central activity area are interpreted as traces of one or several short visits during the latter part of the Early Mesolithic. The difference in elevation between the find concentrations 1 and 5 might be of significance in this respect. Due to the rapid land upheaval during this period (*cf.* Romundset, chapter 3.2, this volume) and the local topography, the ocean has withdrawn quite rapidly from the site, and find concentration 1 might represent a slightly older visit to the site than find concentration 5. On the other hand, as the landscape at Kvastad was quite open and relatively level, Kvastad A4 may have had an attractive and sheltered location even though the beach zone was approximately 50 metres away, *c.* 8400 cal. BC, when the sea level was 47–48 metres higher than at present. In this case, the difference in elevation between find concentrations 1 and 5 does not necessarily have a chronological relevance, but could rather reflect an internal settlement structure.

The sites located along the prehistoric bay at Kvastad could have functioned as a large settlement in the latter part of the Early Mesolithic (see also Viken, chapter 2.2.7, this volume). The sites Kvastad A4, A1 north and A2 southwest could have functioned as contemporaneous settlement sites, while the sites

Kvastad A1 south and Kvastad A5-6 could have served as observation posts (*cf.* Stokke *et al.*, chapter 2.2.5; Stokke & Reitan, chapter 2.5.5, this volume; Viken, chapter 2.2.7, this volume). During the period 8500–8300 cal. BC, these sites were located along a sheltered bay in a fjord. The fjord continued past the bay in a northeastern direction. Just northeast of the bay, the fjord formed two narrow sounds separated by a large island. This may have created favourable hunting and fishing opportunities in the area. In addition, there were multiple routes to travel to and from the site by boat. Around 8300 cal. BC, with a sea level 44 metres higher than today, the Kvastad area changed dramatically as the sounds northeast of the bay became dry land.

2.7.7. KVASTAD A5-6 – AN EARLY MESOLITHIC RETOOLING SITE

At the time of excavation, Kvastad A5-6 was located 46–49 m.a.s.l. The southern part of the site constituted a slightly elevated area limited by a small knoll to the east and by sloping terrain to the south. To the west, the site was limited by rocky outcrops and rising terrain. At the time of occupation, the site was located on a small ness close to a sound (fig. 2.2.7.1)

A total of 1018 lithic finds of quartz (45 %), flint (34 %), metarhyolite and volcanic rock (21 %) were recorded (table 2.2.7.3). Formal flint tools and debitage include microliths, a burin, retouched blades, a scraper, blades, microburins and a core. The quartz material is solely composed of waste from the reduction of two cores. The metarhyolite finds include several axe fragments, a retouched fragment, flakes and fragments. A core axe and waste from the modification of this axe constitute the finds of this volcanic rock. Selected finds are illustrated in figures 2.2.7.4–2.2.7.6. The artefacts were distributed in two distinct areas – one on the elevated surface in the southern part of the site, Kvastad A5-6 south, and one to the north of the knoll, on the lower-lying and east-sloping surface, Kvastad A5-6 north (figs. 2.2.7.7–2.2.7.11). Flint blade production from two different cores and modification of the core axe has taken place at Kvastad A5-6 south, while quartz has been worked at Kvastad A5-6 north. Metarhyolite was recovered from both activity areas.

Based on local shoreline displacement curves and the lithic material, the site can be dated to the last stage of the Early Mesolithic, *c.* 8400–8300 BC. The height difference between the two parts of the site might be of chronological significance; the southern area may have been visited when the sea level was approximately 45 metres higher than today (*c.* 8400 BC), while the northern area may have been visited when the sea level was approximately 43 metres higher than today (*c.* 8300 BC, at the earliest). The diagnostic finds indicate a possible age difference between the two parts of the site. Finds like lanceolate microliths and microburins date the southern activity area to the Early Mesolithic (*cf.* Jaksland 2014; Jaksland & Fossum 2014: 51, 57), while a scalene triangle found close to the northern area shows that this lower area has been visited in the Middle Mesolithic (*cf.* Mansrud 2013a).

Axe production in metarhyolite is recorded on Early Mesolithic sites further northeast (see also Viken, chapter 2.2.3, this volume), while core axes first appear in the Oslofjord area at around 8600 BC (Jaksland 2012a, 2012b; Fossum 2014a; Reitan 2016: 42; Eymundsson *et al.* 2017). In an effort to establish whether the core axe in volcanic rock found at Kvastad A5-6 was made on site from a blank, the axe and the debitage were refitted. The refit (fig. 2.2.7.4) however demonstrates that a larger axe was brought to Kvastad A5-6 and modified there. The edge preparation on the core axe and an edge fragment from an axe in metarhyolite from Kvastad A5-6 show similarities with Early Mesolithic flake axes by being struck from the side of the axe.

Another aspect connected to the flint tool assembly is that the microliths and tools are made of other flint types than the blades produced on site. This implies that finished tools (composite tools, scrapers) were brought to the site, and that retooling may have been the main activity on site. A residentially mobile lifestyle is also expressed in the blade reduction, which is incomplete, as blades and waste related to the initial reduction phase are lacking. Complete cores were brought to Kvastad A5-6 where they were reduced. Mended tools, a collection of blanks for tools and one of the cores were then carried away from Kvastad A5-6 to be used elsewhere.

Several of the sites in the Kvastad area are chronologically contemporaneous and may be seen as parts of a complex of several sites during the final stage of the Early Mesolithic. Kvastad A5-6 was located in the periphery of this activity area, albeit at a strategic point, and seems to have been a place for retooling activities. From this site, one would have control of people arriving in or leaving the Kvastad area, but the people on site may primarily have been on the lookout for fish and other fauna in the fjord while mending their tools. Kvastad A5-6 is interpreted as a *special-purpose site*, i.e. a hunting stand or an observation point (*cf.* Binford 1983a). According to Binford (1983b: 284) work is mostly done in dead time on items brought to these sites, and debris from work on incomplete items will dominate. All in all, the lithic material from Kvastad A5-6 shows that activities centered around preparation and mending of finished tools brought to the site. If the lithic material is the result of several visits, the site function seems to have been the same

throughout the period of its use. On the opposite side of the bay, the site Kvastad A1 may have had a similar function (*cf.* Stokke *et al.*, chapter 2.2.5, this volume). If these sites were hunting stands, it is interesting to note that the sites may have been in alternate use, depending on the wind direction. On the other hand, if the sites were observation points used to control who departed from or arrived in Kvastad, scouts on both sites would be ideal, as the sites were located at two different points of entry to the Kvastad area.

The absence of hearths and the low number of lithic finds and formal tools indicate that Kvastad A5-6 was used for short-term stays on one or more occasions. Kvastad A5-6 was perhaps used by the same people who occupied other sites in the Kvastad area, and may therefore have been visited a number of times without functioning as a settlement site.

2.7.8. HESTHAG C4 – A MIDDLE MESOLITHIC HIGH MOBILITY SITE CONTAINING TRACES OF COMPOSITE TOOL PRODUCTION

At the time of excavation the site was located 33–35 m.a.s.l. The site was sheltered by rising terrain to the west and by a small knoll to the east. When occupied (*c.* 8200–7900 BC) the site was situated on a southeast-facing ness positioned between two deep, sheltered sounds, one to the north and one to the south, and an open fjord basin to the east (fig. 2.3.1.1).

During the excavation of Hesthag C4, it became clear that the finds were concentrated on the eastern part of the site. This area was interpreted as a central activity area on the site and was excavated in its full extent. A cooking pit, visible as a concentration of fire-cracked stones, was located on the western fringe of this central activity area. Due to visible natural disturbances in the soil, this activity area has not been divided further into find concentrations or activity areas. Consequently, all interpretations of activities on the site are based on the lithic assemblage.

A total of 2 455 lithic finds of flint (96 %), quartz (3 %), other rock types (0.6 %) and jasper (0.1 %) were recorded. Formal flint tools and debitage include scalene triangle microliths, borers, scrapers, rulers, conical microblade cores, bipolar cores, blades and microblades. An irregular core and flakes are among the quartz finds. The finds of other rock types are a shaft-hole hatchet, a polished flake (presumably from a chubby, pecked adze), hammer stones, grinding stones and a large quartzite blade. A retouched jasper flake can be refitted from the three jasper fragments.

Two samples from the site were radiocarbon dated (see fig. 2.3.1.9): one sample from the above-mentioned cooking pit and a second, reference sample, from a part of the site not yielding finds or structures. The lack of visible charcoal in the cooking pit was interpreted as a result of post-depositional weathering attributable to rainfall and podsolization (*cf.* Rankama 2004: 60). Therefore, charcoal was collected from the profile through the cooking pit as part of the macro fossil sample. The radiocarbon date-result obtained from the sample, 8170–7730 cal. BC (8800 ± 40 BP), corresponds well with the shoreline displacement dating and the lithic finds. The reference sample was collected in the same manner and from the same depth as the sample from the cooking pit, to investigate the presence and age of naturally occurring charcoal in the soil. This reference sample contained small pieces of charcoal and a more diverse range of tree species than the sample from the cooking pit. This could be evidence of a forest fire, as southeast Norway is known to have frequently been subject to such occurrences (Ohlson *et al.* 2009). The radiocarbon date-result obtained from the reference sample, 2830–2505 cal. BC (4100 ± 30 BP) is approximately 5000 years younger than that from the cooking pit, and cannot be considered as related to the recorded Stone Age activities at the site.

The presence of scalene triangles, conical microblade cores with faceted platforms, blade borers and "rulers" typologically dates the site to the Middle Mesolithic (Jaksland 2001; Bjerck 2008d; Åstveit 2008a; Sjöström & Nilsson 2009; Solheim 2013a; Damlien 2014). The large number of blade fragments that occur on Middle Mesolithic sites has been attributed elsewhere to deliberate breakage for differentiated use (*e.g.* Rankama & Kankaanpää 2008: 895, 2011: 191–194; Damlien 2016: 384–387). These blade fragments are frequently considered to be a type of knife/burin, or "ruler", used for making grooves in bone/wood handles where sharp stone implements later are fastened as edges or points (Sjöström & Nilsson 2009). A total of 27 possible rulers were found at Hesthag C4, all in the central activity area. The presence of this tool type reveals an otherwise invisible technology on sites without organic remains – the production and use of composite tools (see *e.g.* Bjerck 2008d; Sjöström & Nilsson 2009; Bergsvik & David 2015). Bergsvik and David (2015) have argued that the production of composite tools requires the use of wedges, borers, "rulers" and grinding stones. Bipolar cores or other informal tool types could have served as wedges. All the tool types required for making and mending composite tools are present on site. Therefore, it seems plausible to suggest these activities occurred in the central activity area of Hesthag C4.

The hatchet from Hesthag C4 is not a common object in the Middle Mesolithic, however, they do occur. Examples from southeastern Norway are *Site 11* at Vinterbro, Akershus (shoreline dated to *c.* 8500 BP/7550 BC) (Jaksland 2001: 83), *Rødbøl 54* in Larvik, Vestfold (radiocarbon dated to 7680–7585 BC)

(Mansrud 2008), and *Hovland 3* in Larvik, Vestfold (radiocarbon dated to 7620–7440 BC) (Solheim & Olsen 2013), but it has been assumed that shaft-hole hatchets were introduced *c*. 7500 BC (see however Reitan 2016). The appearance of polished stone axes/adzes and hatchets has recently been linked to the introduction of the conical core pressure blade technology into the western, northern and central parts of Scandinavia, at approximately 8200 BC (Damlien 2016: 417–420). The hatchet from Hesthag C4 may therefore be dated as far back as 8200 BC, as other elements that Damlien (2016: 420) connects to the northeastern tradition, such as conical cores with faceted platforms and tools associated with slotted bone technology, are also present in the material from Hesthag C4.

Hatchets are most commonly attributed to status or interpreted as being objects connected to rituals (*e.g.* Edgren 1977; Glørstad 1999, 2002, 2010; Karsten 1994; Skår 2003; Solberg 1989), and only occasionally as practical tools (*e.g.* Broadbent 1978; Vinsrygg 1979). Glørstad (1999, 2010: 193–197) argues that hatchets were symbolic objects that were frequently deliberately broken and sacrificed in water. Furthermore, he believes that the similarities between hatchets and antlers gave status to their owners:

> […] they were deliberately made in a shape that gave *associations* to antlers and antler-work. The hatchets became symbols or derivations of the antlers of the large deer animals. […] The possessors of the hatchets were the powerful males of society, or put in another way, they used an obvious symbol of power from nature as a symbol of social power (Glørstad 2010: 231).

An interpretation of the hatchet from Hesthag C4 as a symbolic object sacrificed in water (*cf.* Glørstad 1999, 2010) could be supported by its find spot. The hatchet was found in the southern end of the site, where the water's edge would have been in around 8200 BC. If, however, the hatchet is attributed to a date of around 7900 BC, more in line with other hatchets from radiocarbon dated sites, it could not have been sacrificed in water. The shoreline at that time was 29 metres higher than today, while the hatchet was found at 33 m.a.s.l.

Estimating the duration of the occupation at Hesthag C4 is a challenge. The find assemblage is relatively small and could be the result of one or several short occupations. Examples of non-locally acquired raw materials indicate that the site was part of a mobile settlement pattern (*cf.* Manninen 2009). The jasper flake is relevant in this perspective. The closest known sources of jasper are in Hordaland, on the western coast of Norway, and Hedmark, in the interior of eastern Norway (*e.g.* Nyland 2015: 35–36). These sites are located respectively *c*. 250 km and 380 km, as the crow flies, from Hesthag C4. The site in Hedmark is the only one known to have been quarried as early as the Middle Mesolithic (Nyland 2015: 150–152). The distance to the source, combined with the fact that only one flake of jasper was found, would imply the people at Hesthag C4 did not have direct access to the source (*cf.* Bergsvik 2003: 298; Damlien 2010c: 65; Nyland 2015: 207–210). The large quartzite blade has few parallels from Middle Mesolithic coastal sites in southeast Norway. However, quartzite blade production is recorded at several Middle and Late Mesolithic sites in interior eastern Norway, for example at Rena, Hedmark (Damlien 2010a, 2010b; Melvold 2010; Persson 2010). Although the evidence is not prolific, these finds indicate that the occupants of Hesthag C4 travelled considerable distances and were in contact with groups occupying the interior of eastern Norway.

2.7.9. HESTHAG C2 – A STABLE SITE DURING THE MIDDLE AND LATE MESOLITHIC WITH TRACES OF NEOLITHIC AND IRON AGE ACTIVITY

Hesthag C2 was located 26–28 m.a.s.l. on a terrace facing east-southeast. To the north, east and south the terrain dropped steeply; in the northern end it dropped towards the site Hesthag C1. To the west, the site was limited by rocky outcrops and rising terrain. At the initial time of occupation (*c.* 8000 BC), the site was located on a ness facing an open fjord basin to the east. The shoreline displacement curve and the local topography show that there was still relatively easy access from the site to the nearby shoreline in the Middle Neolithic, even though the site then was located approximately 15 m.a.s.l. (fig. 2.3.2.1).

The excavation unearthed seven hearths and a cooking pit, and a total of 19,469 lithic finds of flint (82.3 %), quartz (11.7 %), rock crystal (5.5 %), quartzite (0.3 %) and other lithic raw materials (0.2 %) were recorded (table 2.3.2.4). Formal flint tools and debitage include a polished, thin-blade flint axe with a distinct rectangular cross-section, microliths, borers, scrapers, conical microblade cores and bipolar cores. Bipolar cores and an arrowhead are among the finds of rock crystal. The quartz material consists largely of poor quality quartz – coarse-grained with natural fractures – and is interpreted as waste related to the cleaning of clusters of rock crystals. A few finds of high quality quartz were found, some of which were retouched. Three blade fragments are among the quartzite finds. Sandstone knives, grinding slabs, pecked chubby adzes, a pendant, hammer stones and a fragment of metarhyolite are finds of other lithic raw materials. Some of the finds are displayed in figures 2.3.2.5–2.3.2.9.

The hearths A2726 (S1) and A2736 (S2) were dated to the Late Mesolithic and the Late Mesolithic-Early Neolithic transition (5470–5220 BC and 4150–3800 BC, respectively) and are to be seen in connection with some of the finds in the areas around these hearths. In addition, three hearths and a cooking pit were dated to the Early Iron Age, between *c.* 350 BC and 250 AD. The hearths and the cooking pit are illustrated in figure 2.3.2.3.

Based on the lithic finds, the shoreline displacement curve and the radiocarbon datings, the Stone Age activity is dated to the period from the Middle Mesolithic to the Middle Neolithic B, *c.* 8000–2350 BC.

The majority of the lithic finds can be dated to the Middle Mesolithic period; conical microblade cores with facetted platforms, sectioned blades with use-wear (*i.e.* rulers), blade borers, microliths and the two pecked chubby adzes are among these finds (Jaksland 2001; Bjerck 2008d; Åstveit 2008a; Sjöström & Nilsson 2009; Solheim 2013a; Damlien 2014; Reitan 2016).

Few finds can be dated typologically to the Late Mesolithic, but conical cores seem to still be in use during this period in Aust-Agder, as in western and southwestern Norway (*cf.* Eigeland, chapter 3.6, this volume; Bjerck 2008d: 87–89), and sandstone knives are found in Middle Mesolithic contexts, but no earlier than *c.* 7000 BC as well as in Late Mesolithic contexts up to *c.* 4500 BC (Reitan 2016). The area from Vest-Agder to Telemark may have functioned as a boundary-area between different technological traditions in western and eastern Norway during the Late Mesolithic, as artefacts related to both traditions are often found together in this area (*cf.* Ballin & Jensen 1995; Bergsvik & Olsen 2003: 398; Bjerck 2008d: 101–102; Reitan & Berg-Hansen 2009; Solheim 2012a: 248–249). This topic needs to be further examined by future excavations of Late Mesolithic sites in Aust-Agder.

The lithic find material and the find distribution (fig. 2.3.2.10) show that the site has been visited several times in the Middle and Late Mesolithic over a period of *c.* 4000 years. Hesthag C2 is therefore interpreted as a stable site during this period.

In his study of a Nunamiut hunting stand, Binford (1983a) observed that certain tools were seen as belonging to the site. These tools were left on site as "site furniture" and were available for everyone who used the site. When the Nunamiut arrived on site, they started looking for the site furniture, and pulled it up from where it was placed. As a result, bigger items were moved upwards in the matrix (Binford 1983b: 278–279). Many of the tools that archaeologists find at such sites are found as a result of site discontinuity (Binford 1983b: 278–279; Vogel 2010: 142–145).

Typical site furniture may be hearthstones, stones for weighing down tents, anvils, hammers, large scrapers and raw material; many tools used as site furniture had previously been part of tool sets on other sites (Binford 1983b: 278–279).

A pecked chubby adze (fig. 2.3.2.5 d) was found standing under a large rock at Hesthag C2. The edge was worn, but the adze was intact and could have been sharpened. As no adze production debris was found on site, the adze must have been brought to the site. The adze's placement, and the fact that it was intact, imply that it was placed there as site furniture in case somebody might need an adze on the site in the future (*cf.* Binford 1983a: 293–298, 1983b: 271). Other tools that may have functioned as site furniture at Hesthag C2 are hammerstones, grinding slabs, sandstone knives and beach flint nodules. In addition, the hearths could have been reused over a long time span.

The lithic finds dating to the Neolithic include a burnt flint axe, flint flakes and fragments with polished areas, probable tanged arrowheads and a pendant. The limited material suggests that the site has probably functioned as an observation point related to hunting, fishing or other outfield activities during this period. However, the burning of the flint axe indicates that the site may have had other functions during this period. Neolithic sites with burnt flint axes are known in Sweden, and L. Larsson (2000) interprets the burning of axes as a ritual sacrifice. The burning could make a magical impression on the audience, as the flint changes colour and explodes in the fire. Furthermore, he points out that these rituals have taken place at elevated points in the landscape where no settlement traces are found, which could imply that the ritual was supposed to be visible to the surrounding areas. Hesthag C2 was located on an elevated surface with a view towards other sites (Hesthag C6 and C7) where Neolithic activity was recorded (see Reitan *et al.*, chapter 3.9, this volume). As there is no evidence for residential activity at Hesthag C2 during the Neolithic use phase, the burning of the flint axe resembles the phenomenon that L. Larsson (2000) describes. On the other hand, Apel *et al.* (1997) interpret burnt axes, tools and ceramics at the Early Neolithic site *Skumparberget 2* in Närke, Örebro, Central Sweden as a form of waste management since the tools were broken previous to the burning. The edge on the axe found at Hesthag C2 was crushed, and the burning could therefore be a type of waste management. However, no other burnt Neolithic tools or ceramics were found in the proximity of the axe, and the axe should have been regarded as a valuable raw material source since it was made of high quality flint. Social or ritual motives might therefore be the reason for burning the axe.

2.7.10. KRØGENES D2 – A LATE MESOLITHIC SITE WITH TRACES OF COMPREHENSIVE STONE ADZE PRODUCTION

Krøgenes D2 was situated at 20–22 m.a.s.l., and was habitable for a long period of time. C14-dates, typological and technological features of the lithic material date the main activity on the site to the Late Mesolithic, *c.* 5300–5000 BC. A total of approximately 23,000 lithic artefacts were recovered, predominantly flint, Nøstvet-adzes and related debris, and grinding slabs. The material has great potential for further research with regard to technology, raw material use, chronology and regionality in the southern Norwegian Mesolithic. The adze-debitage indicates production, rather than intensive use of Nøstvet-adzes. The finished, used and deposited adzes seem to a large degree to be of a different raw material from the production waste material, thus pointing to an itinerant use of the landscape, where ready-made adzes were brought to the site, whilst adzes produced on-site were taken away. An attribute analysis performed on a selection of the flint inventory from Krøgenes D2 suggests that blades and microblades were made with indirect technique and pressure technique on conical cores rather than handle cores. This may indicate that this technological concept continued through the Late Mesolithic in southern Norway. Simultaneously, the adzes have cultural affinity with the eastern Norwegian Nøstvet-complex.

2.7.11. KRØGENES D7 AND D10 – TWO EARLY NEOLITHIC SITES WITH BLADE PRODUCTION

The two sites Krøgenes D7 and Krøgenes D10 were situated 18 and 19 m.a.s.l., respectively, and facing each other across a deep, narrow inlet, which in prehistory entered from Krøgenes. As they were closely situated, only *c*. 60 m apart and at approximately the same height above the present sea level, the sites are presumed to be more or less contemporaneous and part of the same settlement pattern, assuming they were shore-bound. They are of greater value seen as a single unit than separately, and are consequently discussed together in this chapter.

A total of 573 finds were collected at Krøgenes D7, of which 323 are of flint, 245 of quartz, two of igneous rock, two of quartzite, and one blade of jasper. At Krøgenes D10 a total of 3956 finds were made. Finds of quartz make up 88 % of the assemblage, while flint and rock crystal make up 11 % and 1 %, respectively, igneous rocks only 0.01 %.

At neither site were there many finds with cortex preserved, 14 % at Krøgenes D7 and 6 % at Krøgenes D10, and there were also few cores. Prepared cores have most probably been brought to the sites, and the limited number of intact cores indicates that still functional cores were carried away when the sites were abandoned.

The recorded cores have primarily a single platform or were struck bipolarly. Most cores are from quartz. Quartz is the dominant material at Krøgenes D10, but the majority of the quartz material comes from a single limited concentration separated from the other finds on the site.

Jasper was found at Krøgenes D7, a material only recorded from two other sites investigated within the project, Krøgenes D2 and Hesthag C4. Jasper occurs naturally several places in the south of Norway. The jasper quarries exploited in the Stone Age are, however, few and far apart, the two closest to Aust-Agder being at *Bømlo*, Hordaland, on the coast of western Norway (*c*. 190 km west of Arendal) and in *Flendalen*, Hedmark in the interior of eastern Norway (*c*. 385 km north-east of Arendal). If the jasper found at Krøgenes D7 comes from one of these two quarries, it would indicate contact across great distances.

Jasper is first and foremost an inland phenomenon in the eastern part of Norway. As an example, pieces of struck jasper were found at practically every site excavated along the River Rena during the *Gråfjell project* (Stene *et al*. 2010: 503), compared to none at the *E18 Brunlanes* (Jaksland & Persson 2014), the *E18 Bommestad-Sky* (Solheim & Damlien 2013), and the *Vestfoldbane* projects (Melvold & Persson 2014a; Reitan & Persson 2014).

It is striking that Krøgenes D7 and Krøgenes D10 have the same tool assemblage, although in both cases these assemblages are very limited in number. Remarkably, no arrowheads were found, but several scrapers and a small number of flakes struck from polished flint axes.

The blade technology applied at the sites is also comparable. Both sites lack intentional microblade production. The blades are large, straight, and very regular. The cores from which these blades were struck have either been removed from the sites or have been exhausted completely. If the latter were the case, then one would expect to find more debitage or blades on the sites.

No archaeological features were uncovered at the two sites in question, hence no datable organic material was collected. Nor were there found any chronologically diagnostic artefacts, except for the pieces of polished flint. A dating of the activity relies heavily on the shoreline displacement curve: according to the sea level curve, Krøgenes D7 became available as dry land during the Late Mesolithic, *c*. 5000–4400 BC at the earliest. Krøgenes D10 would accordingly have been available around 5000 BC (*cf*. Romundset, chapter 3.2, this volume). The most likely dating of the two sites is little later than this, most probably in the earliest part of the Neolithic.

There are certain technological traits in the assemblages that support these dates. Microblade production seems to have been phased out by around 4350 BC (Solheim 2012a: 81), whereas blade production by cylindrical core technique was not introduced to the coastal regions of southeast Norway until the second half of the Early Neolithic (Solheim 2012a:

113–114; see however Reitan 2015). Krøgenes D7 and Krøgenes D10 display neither microblade production nor discernible traces of cylindrical technology. Along with the pieces of polished flint, this supports a dating to the first half of the Early Neolithic, or between 3900 and 3600 BC.

The technological traits identified in the material from the two sites are markedly different from the pattern observed at Krøgenes D2 close by. Krøgenes D2 was situated approximately 45 m north of Krøgenes D7, and about 3 m higher. There were few large blades at D2. Microblades and Nøstvet stone adzes abound and a collocation of technological attributes indicates the use of direct and indirect or pressure techniques, with a clear preference for pressure technique (Mansrud *et al.*, chapter 2.4.1, this volume).

Krøgenes D2 dates to around 5300–5000 BC based on radiocarbon dates and the shore displacement curve. The time period separating Krøgenes D2 from Krøgenes D7 and Krøgenes D10 witnesses the shift from microblades and chipped stone adzes to large blades and polished flint axes. The sites are also compared to Krøgenes D1, which was situated approximately 100 m southwest of Krøgenes D10, and 2 m lower, and where cylindrical core-technology was employed.

Thus, within a very limited area at Krøgenes, one can follow one of the central technological developments in the Stone Age.

2.7.12. KRØGENES D1 - A SHOREBOUND SITE WITH FEATURES AND FINDS FROM THE LATE MESOLITHIC, THE EARLY NEOLITHIC AND THE MIDDLE NEOLITHIC

Krøgenes D1 was located on three terraces between 16 and 22 m.a.s.l. on a northeast-facing slope. In spite of the height differences and a possible age difference, the three terraces were investigated as a unit. The digging of evenly distributed test pits during the excavation's initial stage revealed that the frequency of finds was high on the middle of the three terraces, but low on the two others. The further examination of Krøgenes D1 was consequently focused on the middle terrace, 19–20 m.a.s.l. This terrace was also the biggest of the three, approximately 55 m long and 8–15 m wide.

During the investigation a total of *c.* 7000 finds were collected from Krøgenes D1. Flint finds constitute 54 % of the assemblage. Quartz is the second most frequent raw material with 45 %, whereas the remaining finds are of rock crystals, sandstone and various local rocks. A number of diagnostic artefacts were recovered, and secondary working was identified on a considerable 3.8 % of the flints. One or two small pieces of flint with traces of polishing demonstrate that polished flint axes were available to those who used the site in the Neolithic. Arrowheads constitute the single most numerous tool category, representing 20 % of all retouched flints. Arrowheads of both rock crystal and quartz are also present, as well as one of polished slate. The majority of the flint arrowheads are transverse-tipped and made of flakes, but the arrowheads also include tanged points of type A and single-edged/oblique points mainly made of blades, as well as a large unfinished tanged point of type B. The high rate of fragmented arrowheads may indicate that extensive retooling has taken place on the site. To judge from the total numbers of blades and flakes, it appears that blades were preferred to flakes for secondary working. The comprehensive quartz material consists largely of flakes and fragments, whereas the cores are predominantly classified as bipolar or irregular. However, certain fragments of seemingly regular blades are also included, demonstrating that quartz, at least to a certain degree, was part of the same technological strategy as flint. The finds of various rock types are dominated by sandstone grinding slabs and axes and adzes. The only complete one is an adze of the *Nøstvet* type. All the others are fragmented, but can be categorised as four-sided types, and both thin-bladed and thick-bladed specimens are present.

The finds on the middle terrace were concentrated in three separate clusters, designated A, B and C from south to north. There were no distinct microtopographical demarcations between the three. Whereas the inventory from A and B share many of the same characteristics, the finds from C include significantly fewer quartz artefacts, fewer arrowheads and no finds of stone axes/adzes or fragments of such tools. The ratio of secondary worked flints is also lower in cluster C. Along with seemingly different technological strategies, this indicates that the find clusters may reflect different phases of use of the site.

The investigated altitudes became dry land in approximately 5000 BC, which constitutes the *terminus post quem* for any human activity on the site. Due to a rather flat shoreline displacement curve in this timespan Krøgenes D1 will have been situated adjacent to the shore of a narrow and shallow fjord in the Late Mesolithic and throughout the Early and Middle Neolithic periods.

This corresponds well with the typological dating of the collected inventory: the Nøstvet adze was found on the uppermost terrace. This adze must be older than *c.* 4500 BC (*cf.* Reitan 2016). A cross-furrowed stone, interpreted as a possible line- or net-sinker, was recovered in the same part of the site and is arguably also of Late Mesolithic date. A Late Mesolithic date also applies to the microblades and microblade cores. The majority of the blade material, however, consists of relatively wide, regular blades. This indicates that serial production of blades from dedicated blade cores has taken place on the site. This trait points towards a predominantly Neolithic dating of the blade material. The collection of arrowheads fits well with a dating that points to the Mesolithic-Neolithic transition. The unfinished, large type B arrowhead, however, is a lead artefact from the Middle Neolithic B. It seems appropriate to see the Middle Neolithic B component from Krøgenes D1 in connection with the finds from the nearby site Krøgenes D5.

Both the typological traits in the collected lithic inventory and the clusters of finds on the middle

terrace at Krøgenes D1 indicate that the site was used for several short-term stays for as long as the site was shorebound and had settings suitable for fishing/hunting/gathering. This is confirmed by the many hearths/cooking pits uncovered. Several of them intersected. The radiocarbon dates obtained from them cover a long time-span. Five of the ten analysed charcoal samples date to the Late Mesolithic (*c.* 4600–4000 BC), three date to the Early Neolithic and the Middle Neolithic A (*c.* 3900–3100 BC) and one to the Middle Neolithic B (*c.* 2500 BC). One sample dates to the Migration Period and cannot be seen in connection with the lithic finds.

2.7.13. KRØGENES D5 – A SHOREBOUND SITE FROM THE MIDDLE NEOLITHIC B WITH TRACES OF RE-TOOLING AND PRODUCTION OF A FOUR-SIDED FLINT AXE

Krøgenes D5 was situated 14–15 m.a.s.l. at the foot of a small hill on a well-sheltered plateau forming a small (approximately 300 m^2) promontory. This promontory was surrounded by steep slopes and ridges of rocky outcrops. The site was topograhically demarcated. Gaps in the outcrops have provided access to the contemporary shoreline and have probably also been suited for pulling vessels ashore. The subsoil at the site consisted mainly of gravel-mixed sand. Based on the site's height above the present sea level the site was assumed to be of late Middle Neolithic age. As few settlement sites from the period have been investigated in the region, the Middle Neolithic, and especially the Middle Neolithic B, is very little known.

The investgation of Krøgenes D5 yielded just short of 2600 finds collected within a manually excavated area of 113 m^2. In contrast to the earlier sites investigated in the area, with considerable amounts of local raw materials such as quartz and various rocks, finds of flint constitute as much as 99 % of the assembly from Krøgenes D5. Among them are a number of diagnostic artefacts, and 2.1 % of the flints exhibit secondary working. Overall, the flint is fine and of high quality when compared to the flint assembly from the earlier sites excavated within the project. A total of ten flakes and fragments of three different flint types have traces of polishing. The pieces have been struck from polished flint axes which have had a secondary value as raw material/cores for small tool production, probably after fragmenting. One of the fragments exhibits a vague facet and stems from the transition between the narrow side and the blade side (both polished), with the blade face displaying a distinct convex shape.

Tanged arrowheads constitute the single most common category of formal tools from the Krøgenes D5 site. The most frequent is subtype B arrowheads (7), followed by type C (5), and type A (2). All are made of regular blades of various sizes, and especially the B and C types are made of thick and wide blades. All the arrowheads are fragmented, but four of them can be refitted and measure between 3.8 and 6.1 cm in length.

Although significantly few blades are complete, the blade material from Krøgenes D5 demonstrates a high degree of regularity, including many wide and arguably long blades, and must be viewed as traces of a systematic blade production. This is also reflected in the fact that blades have clearly been preferred to flakes for small-tool production. The average width of the blade material overall is 12.6 mm. There are also signs in the blade material indicating that rather big, cortex-covered flint nodules were brought to the site, and that the primary reduction and forming of one or several nodules has taken place on the Krøgenes D5 site. At least some blades have been struck from cylindrical cores. The regularity of the blades is not reflected in the core material, however. The collected core material is dominated by bipolar cores, but traces of platform preparation and side fragments of blade cores are present. This indicates that the cores from which the many regular blades have been struck have been transported away from the site.

A considerable number of the collected flakes from Krøgenes D5 share certain noticeable attributes, being short and wide ("wing-shaped") with a faceted platform of lenticular shape and a platform angle of *c.* 90°, as well as pronounced bulbs and straight curvature. Such flakes are diagnostic for the production of Neolithic flint axes with rectangular cross-sections (*cf.* Högberg 2008). It is consequently suggested that a flint axe has been formed on Krøgenes D5. The initial cleaning and removal of the cortex from the nodule has probably been carried out elsewhere. It is widely assumed that Neolithic flint axes were imported into what is today Norway from South Scandinavia as complete, polished pieces, or occasionally as unpolished blanks, and that they were not locally produced. The flakes interpreted as flint axe production debris from Krøgenes D5 may prove that this assumption is wrong, at least to a certain degree.

According to the local shoreline displacement curve, the investigated altitude on Krøgenes D5 became dry land around 3000 BC. Situated at 14–15 m above today's sea level, the site will have been situated adjacent to the contemporary shoreline of a shallow,

narrow fjord up until *c*. 2400 BC. Based on the altitude a shorebound use of the site therefore dates to the Middle Neolithic B. This corresponds well with the typological dating of the finds. The finds can be considered as chronologically homogenic and may be interpreted as indicative of one or a few short-term stays within a relatively short time. No features with dateable organic matter were identified, thus no radiocarbon date-results were obtained from the site. Additionally no pottery was retrieved that can be dated with certainty to the Middle Neolithic B. This may mean that the stays on the site in the Middle Neolithic have not incuded the use of pottery, or, alternatively, that no pottery was preserved.

The use of Krøgenes D5 has probably been based on activities connected to hunting and fishing within a larger mobile settlement system that arguably also included the nearby site Krøgenes D1. The Middle Neolithic B is, as noted above, very little known in southeast Norway. Albeit small, and with no radiocarbon date-results, Krøgenes D5 sheds new, important light on the period. Not least, the traces of the production of a flint axe represent an important insight.

2.7.14. MØRLAND D11 – A LATE NEOLITHIC CAMP SITE WITH «NØKLEGÅRD POINTS»

The site *Mørland D11* was situated at 55–56 m.a.s.l. and was therefore initially assumed to be an Early Mesolithic shore-bound site. The excavation resulted in the collection of 123 finds of worked stone, mostly flint (87 %), but including small amounts of knapped quartz. The finds were recovered within an area of 10 m^2 in connection with a stone feature with an unknown function. The flint material is mostly produced through bipolar knapping, and bipolar cores were also found at the site. A large portion (66 %) of the material is burnt and the percentage of secondarily worked flint is also high (11 %). The tool group is dominated by *Nøklegård points*, a type of tool that is made from small flakes and fragments using a non-formal approach, but with the goal of creating a long, narrow point through retouch. At the site, 8–10 tools of this type have been found, with the majority discarded as used and broken, but possibly also including unused specimens. These tools have earlier been shown to have been used for grooving and reaming bone or antler objects. Other finds from the site include a retouched blade, possibly a tanged arrowhead of type A, and a fragment of a ground, four-sided axe.

The site displays many similarities to a few sites investigated earlier in the counties of Vestfold and Telemark, dominated by Nøklegård points. In comparison to these, Mørland D11 should be dated to Late Neolithic/Early Bronze Age, most likely to the earlier part of this time-span. The reference sites are all, as is Mørland D11, situated in locations peripheral to the main contemporary settlement areas, which are closer to available farmland. Therefore, the reference sites and Mørland D11 are more likely to be connected to the exploitation of outlying areas. These sites have earlier been interpreted as sites for trapping small game, and the Nøklegård points, it has been suggested, were tools for the maintenance of complex traps. It is here suggested that other kinds of use of uncultivated areas during the Late Neolitihic/Early Bronze Age should be considered, and that the tools in question do not necessarily reflect the primary function of these sites.

2.7.15. KVASTAD A2 – A SITE WITH TRACES OF CEREAL CULTIVATION IN THE MIDDLE AND LATE NEOLITHIC IN ADDITION TO FINDS FROM THE EARLY AND MIDDLE MESOLITHIC

Kvastad A2 was situated 44–51 m.a.s.l. on a large gently sloping promontory facing south-east. The promontory was delimited by marshy lands towards the north, south, and east – the Låmyra bog. During the excavation, a total of 16,577 finds were unearthed. Included are three sherds of pottery, one piece of burnt clay, and an iron nail. The other finds are of flint, rock crystal, quartz, and igneous rock.

Based on the distribution of the finds, it is possible to outline two distinct activity areas, one on a small outcrop on the slope to the southwest and one on the promontory to the northeast. The assemblages indicate an Early and Middle Mesolithic phase in both areas. The earlier phase is represented by flake axes, single-edged points, Høgnipen points, lanceolate microliths and microburins. The local shore-displacement curve indicates that the site became available as dry land after *c.* 8500 cal. BC at the earliest, and *c.* 8300 cal. BC at the latest. This proves that during visits in the late Early Mesolithic the site was shore-bound. The Middle Mesolithic phase is represented by flint rulers and microblade technology based on conical cores. Two hearths and one pit were radiocarbon dated to 7720–7580 cal. BC, 7520–7320 cal. BC, and 7290–7040 cal. BC, witnessing several short-term stays at the site during the Middle Mesolithic. During the Middle Mesolithic the site was situated close to, but not immediately adjacent to, the sea shore.

On the promontory there were also traces of early agriculture. A number of tools, including a sickle, a fragmented dagger and bifacially flaked arrowheads were found, which are diagnostic of the Late Neolithic. Several burnt cereal kernels were found in a layer of possibly agricultural origin as well as in a small pit. Emmer wheat, hulless barley, and oats were all present. The radiocarbon dating of these pointed to two phases of agriculture at the site: one grain of barley from the pit was radiocarbon dated to the Early Neolithic-Middle Neolithic transition, 3500–3035 BC, and one grain of wheat was dated to the Middle Neolithic A, 3310–2880 cal. BC. A total of four other samples of wheat, barley, and oats from the same pit and the cultivation layer were all dated to the Late Neolithic, 1890–1690 cal. BC. The suggested two phases of cultivation at the site correspond well with increased levels of charcoal particles identified in a pollen core sampled from the adjacent Låmyra bog. However, despite a detailed counting of a great number of samples from the relevant layers, no cereal pollens were identified in the pollen core. The charcoal layers in the bog sediments probably reflect clearances of the vegetation to establish fields. In a Norwegian perspective the earliest direct evidence of cereal growing is strikingly early. The proven growing of oats is also very early, even in a Scandinavian perspective.

On the southwestern part of the site, there had been an extensive use of quartz. However, the occurrence of diagnostic artefacts from all phases of the site shows that the use of this raw material cannot be connected to one period only.

2.7.16. HESTHAG C7 – FROM FARMLAND TO GRAVESITE DURING THE EARLY IRON AGE

Hesthag C7 was situated in a gentle southfacing slope at the embouchure of a narrow valley with steep hillsides on either side – Hesthagfjell to the east and Lyngfjellheia to the west. The excavation at Hesthag C7 uncovered two gravemounds, a holloway running along the gravemounds as well as a lynchet. One of the gravemounds was round, measuring *c.* 9 metres across and *c.* 1 metre height. The other one was a long mound, approximately 11.5 metres long, 4.5 metres wide and 0.6 metres high.

Both gravemounds were encircled by foot-ditches, but with a gap in the ditch along the western side of the long mound. The round mound was made of sandy soil covering a central cairn of stones up to 0.7 metres in size. However a distinct plunder-pit had been cut through all the way down to the subsoil, and no objects or traces of a burial were recorded in spite of extensive sieving during the investigation. A sample from the charcoal-mixed fill in the plunder-pit was dated to AD 1690–1960. A shallow depression in the long mound, along with potentially redeposited stones superimposed on the foot-ditch at the northern end of the mound, may show that the long mound, too, has been plundered. This could not be established however. No burial was identified in this gravemound either.

A holloway cut across the site from south to north and diverged into two tracks by the gravemounds. The excavations of the gravemounds and the holloway also uncovered a fossilised cultivation layer under a lynchet on the eastern half of the site. A posthole was identified beneath the cultivation layer. A charcoal sample collected from the posthole was dated to the last stage of the Late Neolithic, 1890–1690 cal. BC. Micromorphological analyses further demonstrate that the round gravemound had been made of previously cultivated soils. Sherds of Early Iron Age pottery and Stone Age artefacts of flint and stone were collected from the lynchet. The flint artefacts, *i.a.* a transverse-tipped arrowhead and a tanged arrowhead, suggest that a settlement site had been located here, probably during the Late Mesolithic or the Early Neolithic. The potsherds in the lynchet may be interpreted as deliberately distributed settlement waste from a nearby farm unit, probably in order to fertilise the sandy fields. The stratigraphy of the site, along with the dating result of AD 70–240 obtained from charred, organic remains ("food crust") on one potsherd from the lynchet, suggest that the gravemounds were erected after the field was left to lie fallow, and probably during the late Roman Iron Age or the Migration Period.

The Hesthag area consitutes a rich cultural environment with a considerable temporal depth, and several of the prehistoric sites in this area were excavated within the E18 Tvedestrand–Arendal project. Overall, these sites demonstrate varied landscape use in the slopes north of today's Lake Totjenn throughout a period of 10,000 years. The data collected from Hesthag C7 provide insights into farming practices, burial customs and communication. The extensive archaeological field work carried out here demonstrates the great potential the Hesthag area has for studies of various facets of the diverse parts of prehistory, both on a local and a regional scale.