

BRM 76 09961	Semicircular sinker	A	1198-1248	1
BRM 76 10296	Float	V	1198-1248	1
BRM 76 10458	Float	IV	1198-1248	1
BRM 76 11504	Semicircular sinker	A	1198-1248	1
BRM 76 12370	Float	VI	1198-1248	1
BRM 76 12840	Float	VI	Ca 1190	1
BRM 76 15425	Float	I	Ca 1190	1
BRM 76 19945	Float	VI	1248-1413	1
BRM 83 00260	Float	I	?	1
BRM 83 02407	Float	VI	1248-1332	1
BRM 83 02725	Float	VI	1332-1413	1
BRM 83 03274	Float	VI	1248-1332	1
BRM 83 03366	Float	VI	?	1
BRM 83 03440	Float	VI	1413-1476	1
BRM 83 03614	Float	I	?	1
BRM 83 03663	Float	VI	1248-1332	1
BRM 83 04041	Float	VI	1248-1332	1
BRM 83 04048	Float	VI	?	1
BRM 83 04419	Float	VI	1248-1332	1
BRM 83 04603	Float	VI	1248-1332	1
BRM 83 05068	Float	I	1248-1332	1
BRM 83 05161	Float	VI	1198-1248	1
BRM 83 05496	Float	II	1198-1248	1
BRM 83 05529	Float	I	1198-1248	1
BRM 94 00001	Semicircular sinker	A	?	1
BRM 104 00316	Float	VI	1520/30-1550/60	1
BRM 104 00371	Float	VI	1520/30-1550-60	1
BRM 104 01204	Float	VI	1248-1350	1
BRM 104 01711	Float	IV	Ca 1198	1
BRM 245 00365	Float	I	1230/40-1280	1
BRM 245 00887	Float	IV	1570/80-1623	1
BRM 245 01004	Float	VI	1623-1640	1
BRM 245 01253	Float	VI	1570/80-1623	1
BRM 245 01798	Float	IV	1280-1350	1
BRM 245 03454	Float	I	1160/70-1230/40	1
BRM 346 01300	Float	I	1 st half of 16 th Century	1

List of finds, fishing by piercing

Number	Object	Type	Dating	N
BRM 0 06500	Barbed point (for plummet?)		1332-1413	1
BRM 0 34046	Fishing spear		1413-1476	1
BRM 0 74750	Conical sinker (plummet?)		1248-1332	1

List of finds, fish traps

Number	Object	Type	Dating	N
BRM 0 11096	Fish trap		1198-1248	3
BRM 0 12607	Fish trap		1248-1332	1

BORGUND AND THE BORGUNDFJORD FISHERIES

Helge Sørheim

The cod fisheries in the Borgundfjord near Ålesund on the northwestern coast of Norway are well known in recent history. The archaeological excavations from 1954 to 1975 of the small medieval town of Borgund, approximately 4 km east of the modern town Ålesund, uncovered artefacts, fishing equipment and fish bones reflecting marine activities. The geographical location, remains of jetties, quays, buildings for storage, etc. in Borgund all indicate that the place to a large extent based its existence on maritime communications and exploitation of marine resources.

The present study is based on archaeological artefacts that may have been connected to fishing and other forms of exploitation of marine resources. Structural remains, such as quays, buildings and other constructions indicating sea-related activities are also taken into consideration together with written sources and ethnological material from later periods in order to evaluate the finds within a larger context.

Based on the archaeological material the aim is to throw light upon the origin and early development of the commercial fisheries and trade of fish products in the Borgund area. One of the questions that will be discussed is whether the fisheries were limited to the shallow, protected Borgundfjord, or whether deep-sea fishing in the Atlantic started in the early Middle Ages. I will also consider whether the sea-oriented settlement of Borgund can throw light on fishing and trade and the role as a centre of those activities. This could hopefully provide a new insight into the importance of the fisheries and the trade of fish products for the emergence and growth of Borgund as a central place and urban community.

The oldest settlement in the Sunnmøre region, from the point when ice withdrew 10–12,000 years ago, showed a preference for the outer coast. Fishing and hunting sea mammals, and

later farming as well, have been the economic backbone in the region for thousands of years. For almost a thousand years, commercial fisheries and trade of catches and fish products have shaped the economy and settlement pattern in Sunnmøre. Fish must have been an important resource in the Middle Ages, not least because of the Catholic fast, which constituted a third or a half of the year. During the fast, meat was prohibited, whereas fish was accepted (cf Olsen this volume).

Deep fjords intersect Sunnmøre, so most settlements are related to the sea, and the marine resources could easily be exploited. At the same time, the sea was an essential means of communication, both locally and on a larger geographical scale. It is thus with good reason that the region is named "Møre" – the sea country – while Norway was called *Norvegr*, the road to the North, i.e. the waters along the coast.

Traditionally, farmers and crofters in Sunnmøre have taken part in fishing, either in the fjords for their own consumption, or in the seasonal fisheries along the coast and out towards the fishing bank Storegga, 100km from land, where the continental shelf drops away into great depths of the Atlantic Ocean.

The prehistoric and historic settlement pattern indicates a densely populated coast and more sparse settlement further inland (Solberg 1976: 11). The favourable agricultural conditions on the outer coast of Sunnmøre, together with the sea and marine resources, were important factors for the location of settlement. The technological level, knowledge of sea and marine resources were the deciding factors in the development of the settlement pattern in the region.

The twelfth century was an important phase for the development of trade in the Middle Ages. At this time the expansion of North European long-distance trade started, which some historians have denoted "the commercial revolution"

of the Middle Ages (Lopez 1971). Large-scale trade increased strongly and new types of goods appeared. Goods such as grain, timber, textiles and fish products increasingly dominated the traditional trade in luxury goods. The peasant-tradesmen and proprietor-tradesmen were gradually replaced by professional urban merchants (Nedkvitne 1983: 16).

Fish and fish products were the first important large-scale export products. The commercial production of stockfish from c 1100, provided an export product for a larger European market. Dried fish, the so-called stockfish, dominated Norwegian foreign trade until the seventeenth century (Dyrvik 1979). The medieval herring production, however, did not exceed the needs of the local farmers. The supply of salt was, as in later times, a bottleneck in the production of herring. Quality herring was in fact imported. In 1553, German merchants sold herring at Bryggen in Bergen according to custom (Nedkvitne 1988: 471-2).

Today, the county of Møre and Romsdal exports more fish than Northern Norway as a whole. In 1996, 35 % of the total export volume came from the region, representing 7,1 billion NOK, in addition to a considerable quantity transported by road to Eastern Norway and shipped from Oslo. It is the start of this commercial activity that will be discussed in this paper.

Different kinds of fisheries

Here I distinguish between fish for one's own consumption and professional fisheries, where the catch was intended for sale. The sociologist Ernest Mandel defines a commodity as "a product that has not been manufactured with the intention of direct consumption, but is intended for trade at the market. Any commodity must have a trade value as well as a practical value" (Mandel 1963: 11). He also points out "when manufacturing started and became general, it radically changed the working methods and organisation of society" (*ibid*: 3).

Thus a commodity only has a trade value insofar as it is manufactured in a community based on trade or a society where trade is commonly practised. A precondition for trade is that there is

a division of labour, that resources are shared differently and that people produce different commodities. In the latter part of the Iron Age, the division of labour was developed considerably. Whereas trade in the Viking Age concentrated on small quantities of luxury goods, there was a shift towards large quantities of necessities, as people increasingly found work outside the primary production of food in a traditional rural society. The emergence of towns, the establishment of a Church organisation and a unified monarchy resulted in specialisation with separate groups of artisans and merchants, a clergy, professional administrators, as well as ordinary workers. The new groups created a demand for foodstuffs, which in turn created new possibilities for trading, among others fish products that was widely available along the Norwegian coast. The obligatory fast also created an increased demand for fish. This increasing demand for fish formed the basis of the commercial fisheries. The new specialisation did not, however, replace farming, and was rather a supplement to the farming run by the crofter-fishermen. As men went fishing for longer periods of time, the wives became responsible for the farms to a larger extent (cf Bertelsen 1998). The gendered division of labour should, therefore, also be taken into consideration.

The area of research

Borgund has a central location as a point of intersection between the fjords and the coast and also in relation to the richest fishing grounds in Western Norway, the Borgundfjord, a spawning ground for pelagic cod. The fisheries in the Borgundfjord from January to April are known as one of the major fisheries in southern Norway as far back as written sources go (Fig 1).

Borgund may have emerged as a central place as early as the transition between the Viking Age and Middle Ages both as a local market place and/or as a fishing station in the Borgundfjord for farmers or crofters who fished for their own consumption. Borgund is mentioned in Snorre's *Heimskringla* in the Saga of Olaf the Saint, in connection with events that allegedly should

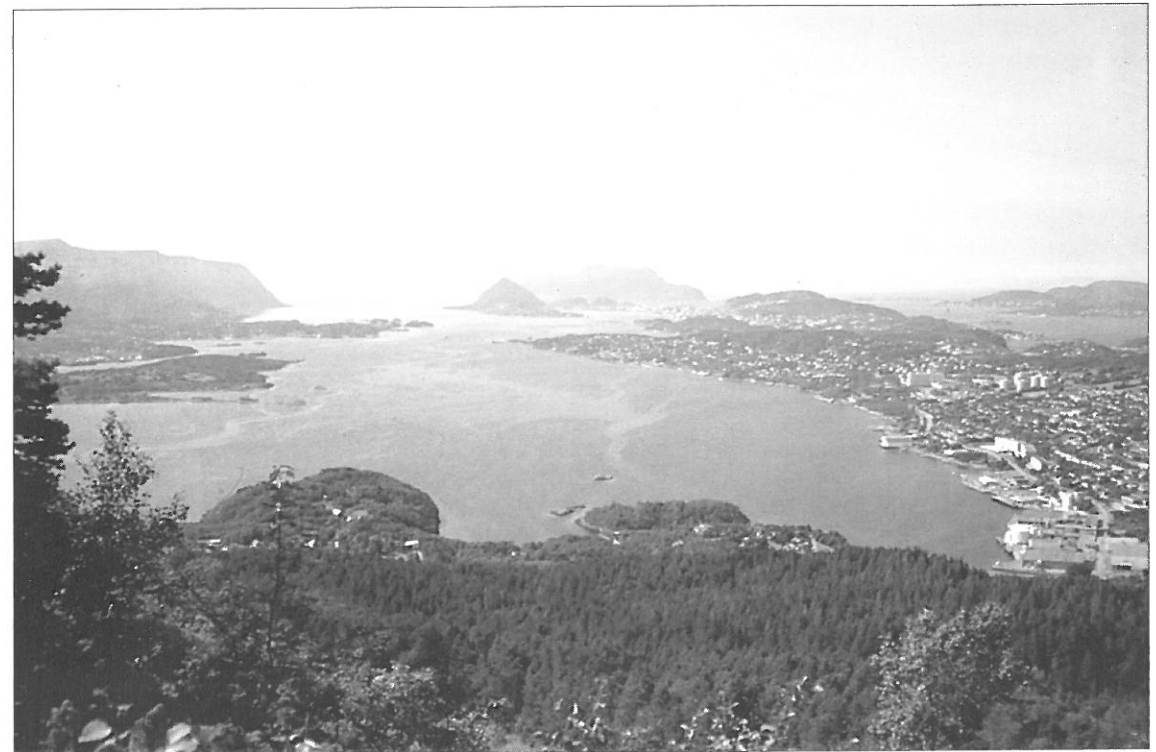


Fig 1 Overview of the Borgundfjord seen from east. The fjord opens up at the sound Breisundet to the left rear. The medieval settlement of Borgund is located on the forested peninsula on the northern side of the fjord. The flat island of the manor Giske is seen in the horizon to the right rear (Photo: H. Sørheim)

have taken place around 1027-28. The place name Hundsvær is also mentioned in this context, and must be identical to the fishing village situated on some small islands west of Borgund. Molvær is another place with the suffix "vær", denoting a small fishing station or settlement.

Borgund is known from medieval literary sources as the most important commercial and administrative centre in Sunnmøre at that time. In the early Middle Ages it is denoted as a market place or town-like settlement, *kaupstaðr* (Nilsen 1976: 6, 174-178). It also emerged as an early Christian centre. The presence of three, possibly four churches shows that Borgund was also the largest religious centre between Bergen and Trondheim.

Already in the latter part of the fourteenth century the written sources indicate that Borgund was deteriorating as a commercial centre. Commercial activities are, however, still mentioned in the early fifteenth century, but a

taxpayer's list from 1520 does not mention a single taxpayer there at that time. Artefacts indicate activities from the early eleventh until the sixteenth century, and the place seems to have been flourishing from the twelfth to the first part of the fourteenth century (Herteig 1957; Sørheim 1990).

The written sources on medieval Borgund and the fisheries in the Borgundfjord are sparse. More extensive sources appear from the seventeenth century, of which Hans Strøm's account of Borgund and the fisheries in Sunnmøre from 1762-67 is the most valuable, published in the two volumes of *Physisk og Oekonomisk Beskrivelse over Fogderiet Søndmør, beliggende i Bergens Stift i Norge*.

This study is, however, mainly based on material excavated during 20 seasons from the early 1950s onwards. The methods of excavation and recording, together with the poor conditions of preservation, are not ideal from the point of



Fig 2 Overview of the medieval settlement area of Borgund. The excavated settlement area is located on the open fields in front of St. Peter's church – the present parish church at Borgund – with the eastern excavation site and the present Medieval Museum. To the left rear, behind the quay the remains of a boathouse of prehistoric type has been located. To the left, the remains of large landing stages for boats can be seen. In front to the left: the sound Klokkersundet runs into the bay Katavågen, with remains of long rows of parallel lying warehouses in both areas. Here, in the hill up to St. Peter's a Christian grave yard from the early eleventh century has been located, and St. Matthew and/or a Christ church to its left. The remains of St. Margaret was located on the outer promontory against Klokkersundet (Photo: R. Engvik, Sunnmørsposten)

view of a modern stratigraphical-topographical analysis. This kind of analysis has been carried out only to a limited degree (Lossius 1977), and is not applicable to the material in this study. Thus, the entire period of settlement and activity from the early eleventh century to c 1500 has been treated more or less as one.

The archaeological excavations and surveys have established evidence of an urban settlement spread over an area of c 45,000 square metres, of which approximately 5,000 square metres have been excavated (Figs 2 and 3). The medieval settlement area is situated on flat plains east of the present parish church at Borgund, rebuilt on the medieval St. Peter's church. The settlement area is oriented towards the sea and faces the Borgundfjord to the south, where remains of large land-

ing stages for boats can still be observed. To the east, the shallow, protected sound Klokkersundet runs into the bay Katavågen (of ON *kati*, m. boat) and defined the northern boundary of the settlement area. Katavågen, which has a shallow and narrow outlet to the sound Nørvasundet in the north, is directly linked to the fjord system and the northbound sailing route. At high tide it would have been possible to row or pull small boats across. Other harbours in the county also have names with the prefix *kat(i)* (Buset 1959), including Katneset (meaning the boat promontory) in Veøy in Romsdal, another medieval small-scale urban community.

The archaeological finds of two buckles in Urnes style and a coin minted by Ethelred (1004–1009) support the early dating from liter-

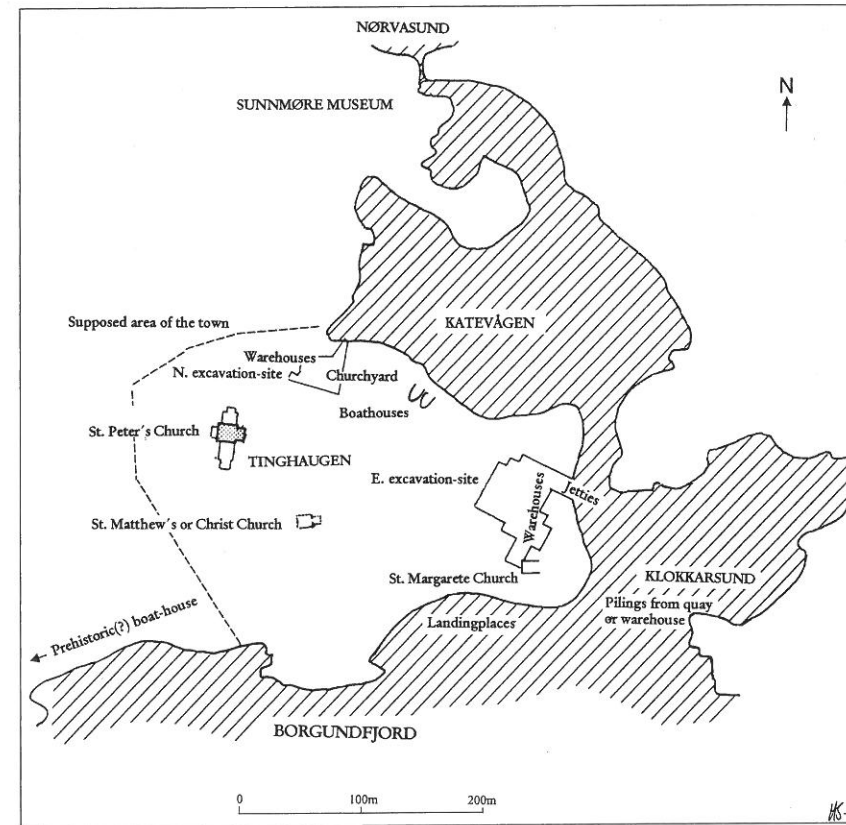


Fig 3 Map of the medieval settlement area in Borgund

ary sources. A cluster of buildings, with among others an assembly hall (Norw. *årestue*), has been dated to the second half of the eleventh century and no later than 1100 (Herteig 1957: 464), a date that also has been confirmed through 14C dating (pers. comm. Arne J. Larsen, University of Bergen). Buildings and ditches uncovered beneath the building must be even older.

Based on the maritime technology of the time and the central location at the junction between the inner fjord-districts and outer coast areas close to the northbound sailing route, Borgund had an ideal location for a local and regional meeting place. The harbour facilities were favourable for boats and small ships, such as *færingar* (boats with four or two pair of oars) and *åtringer* (boats with eight to ten or four to five pairs of oars), which were used from prehistoric times and in the fisheries until the twentieth century. The land here was also suitable for settlement,

and last but not least it was close to the fjord and rich marine resources. Today, the harbour is shallow, as Klokkersundet must have been filled in at a later stage.

In a bay near the former church pier in Borgund, further west in the Borgundfjord, the site of a large boathouse is still visible. In the 1760s, Strøm linked the site to a medieval shipyard and shipbuilding, mentioned in literary sources (Strøm 1766: 70-719). As the site has not been excavated, this cannot be confirmed. According to the saga, a longship for twenty oars was under construction when the small town was ravaged

during the civil wars in Norway in the second part of the twelfth century (Herteig 1957: 447).

Rows of postholes that have been found in the direction of Klokkersundet, have been interpreted as remains of long rows of parallel lying warehouses stretching from the beach where wooden piers have been located (Fig 4). The longest buildings measured more than 30m in length, and the area covered by excavated remains of warehouses was approximately 600 square metres, indicating a large storage capacity. Similar building remains have also been found further north in Katavågen. Since large areas have not been excavated, there could possibly be even more of them. An alternative, albeit perhaps less likely, interpretation is that some of the postholes could belong to structures for drying fish. Furthermore, two pits in the ground towards Katavågen have been interpreted as remains of boathouses.

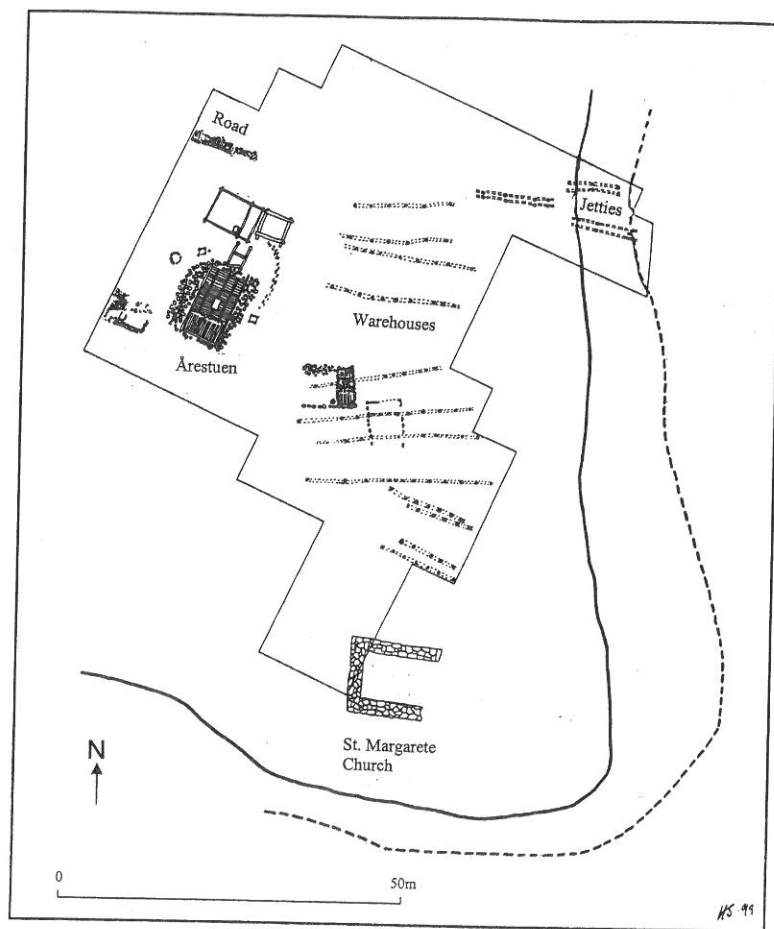


Fig 4 The eastern site with traces of warehouses and piers

On the beach at Klokkersundet, 16 postholes are arranged four by four in a quadratic formation and may be connected with the remains of a bridge. In 1766, remains of a wooden bridge, which had crossed the sound "in the old times", were still visible (Strøm 1766: 72). A possible medieval bridge across the sound would, however, have blocked the entrance to the inner harbour area. It is therefore more likely that the postholes should be interpreted as remains of the foundation of a warehouse or a pier.

Behind the harbour area with the remains of boathouses, piers and warehouses, traces of residential and commercial buildings were found. The best-documented cluster of buildings, with the mentioned assembly hall, is partly preserved and today exhibited in the site museum, the Me-

dieval Museum of Borgund-kaupangen.

Three stone churches, perhaps four, judging by the recorded names, demonstrate Borgund's importance as a medieval church centre. These were dedicated to St. Margaret, St. Peter, St. Matthew, and/or a Christ church. The marble church of St. Margaret towered the headland. The cross section in the present parish church is what is left of the medieval St. Peter's church. It is situated at the top of the hill at the border of the medieval settlement area, behind the so-called Tinghaugen – a mound where local things allegedly were held. The remains of the St. Matthew's or Christ church, another marble church, are located near this site.

These stone churches were probably built in the twelfth century (Kloster 1977: 11-12). However, they are preceded by a cemetery containing 3-400 graves that can be dated to the early eleventh century, based on the mentioned Ethelred coin from 1004-9 (Sørheim 1995: 12). Although no traces of earlier wooden churches have been found, it may be assumed that there were at least one or several churches here in the early missionary period, in conjunction with the cemetery. Thus Borgund was in all likelihood an early Christian centre, which was also the case at Veøy further north, in Romsdal (Solli 1996: 158).

The churches also demonstrate considerable economic strength and a certain population size. Capital was needed in order to build the churches in stone, and they were probably raised through donations, tithe and rent of the land owned by the Church in the area. The Church eventually became a considerable economic power. In the

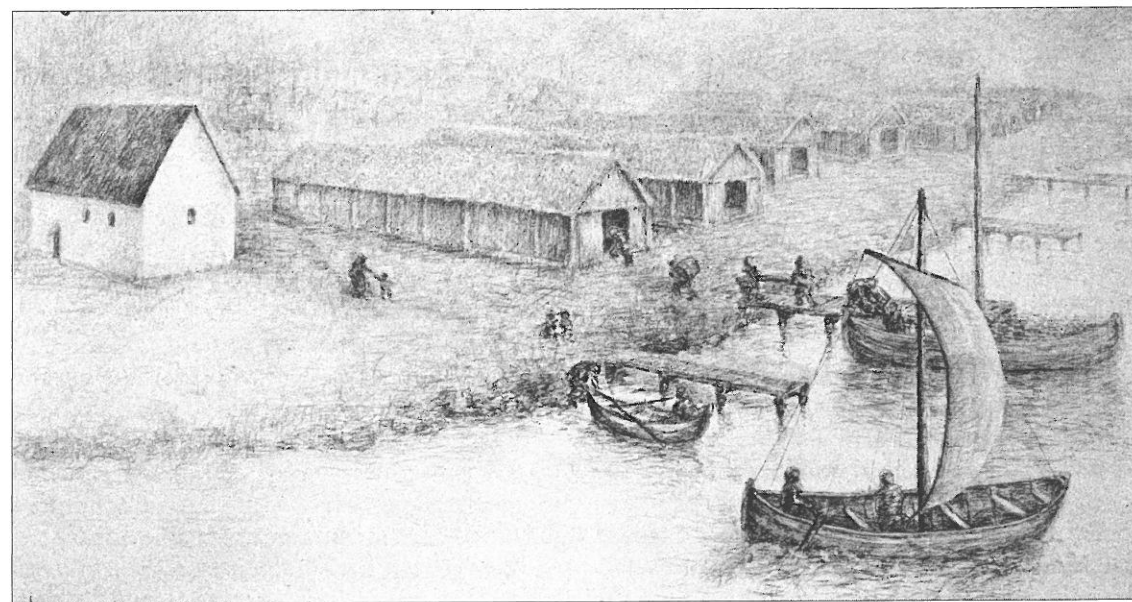


Fig 5 Reconstruction of the harbour area against Klokkersundet: St. Margarete, warehouses and piers (Drawing: T. Walderhaug)

post-medieval period, in 1648, about 25 % of the land in the region was owned by the Church (Kvamme 1994: 272).

The Church also took active part in commercial activities in the Middle Ages, and both bishops and monasteries owned merchant ships, which crossed the North Sea in the beginning of the fourteenth century (Nedkvitne 1983: 233-235). There is no written information about such involvement in Borgund. We must, however, assume that considerable amounts of goods, including fish products, in forms of tithe and land rent came through the ecclesiastical and commercial centre of Borgund (Fig 5). The Church may also have taken part in and organised the fisheries. The Church should therefore be regarded as a substantial factor for the origin and growth of Borgund.

The aristocratic Giske lineage may also have played an important role in the economic history of Borgund in the Middle Ages. The manor of Giske was located on the small island Giske, just outside Borgund and prominent chieftains from Giske appear in the written sources for the first time in connection with the battle of Stiklestad in 1030. The Giske estate became one of the largest in medieval Norway, owning land all over Sunnmøre. It also had its own tenement in Ber-

gen. Some of the medieval noblemen from Giske are directly connected with Borgund, like Petter of Giske. As the harbour facilities at the island of Giske were poor, Borgund may have served as Giske's port and harbour in the manor's trading activities, and the majority of its trade may have been channelled through Borgund. The rich fish resources in the Borgundfjord should also be considered in connection with Giske's power and economic strength.

Methodological considerations

Although fishing and catching mammals have long traditions as the backbone of the coastal economy, this part of history has, rather paradoxically, been sparsely documented. There are several reasons for this. Many of the tools were made of organic material that, with a few exceptions, have not survived the ravages of time. Another problem is that efficient fishing methods were developed at an early stage, resulting in few typological changes; thus, the artefacts are difficult to date. Norwegian folk museums, based on nationalistic and romantic farming traditions, have until recently shown little interest in fishing and coastal culture. Consequently, the pre-industrial fishing equipment that would have helped to explain the

archaeological material has therefore only been preserved and documented to a small degree.

One of the first tasks when working on an archaeological material such as fishing equipment is to interpret and explain the activities the artefacts reflect. We can resort to synchronous analogies based on contemporary material, or retrospective methods.

Although retrospective methods are frequently used in both historical and archaeological research, they should be used with caution. Certain criteria must be met in order to develop sustainable theories through analogies (cf Binford 1972: 369; Sørheim 1981: 174-175). One of these criteria is that a historical relationship exists between the archaeological material and the recent, documented material. In a study of for example crafts and craftsmen, the possibilities of retrospective studies vary according to the sources and the extent of development within the particular craft. This also applies to fishing and fishermen.

Fishing is a traditional occupation, and the opposition to innovations can be illustrated by the scepticism and resistance to new and more efficient fishing methods. There was for instance great resistance to the introduction of long lines in the Borgund fisheries in the seventeenth century (Myklebust 1971: 18-21).

As fishing was traditional, at least until the major innovations in the twentieth century, the use of analogies can be justified. I find a retrospective analysis acceptable when objects found within a similar geographical and physical setting belong to a common historical development (Sørheim 1981: 174).

Few researchers have, however, recorded and examined fishing tackle that is suitable for comparative studies of medieval fishing equipment. In my own study, O. Nordgaard's study, *Træk av fiskeriets utvikling i Norge* (1908) has been of great help. His book was written when fishing equipment was still in use that can to some extent be compared to medieval equipment.

An important comparative material from Northern Norway has been analysed by Bjørn Ebba Helberg (1995). A large material from the excavations in Bergen is published by Ole Mikal Olsen in this volume, and I refer to his survey of the history of research on the subject.

The Borgundfjord and The Fisheries in Sunnmøre

The main spawning ground for the pelagic cod is Lofoten. The fisheries here date to the early twelfth century at the latest (Bertelsen 1994: 120), and Vågan was the most important marketplace for stockfish from Northern Norway from the 1170s onwards (Nedkvitne 1983: 189).

Part of the shoal spawned as far south as Møre (Eliassen 1983: 4), and the 12 km long Borgundfjord is a well known spawning ground with a depth varying between 50 and 125m (Fig 6). Here an extensive cod-fishery takes place from February until April. Sunnmøre is one of the southernmost areas with climatic conditions for producing stockfish of reasonable quality.

The deep rift Breisunddjupet in the continental shelf in seabed between Godøy and Hareidlandet is 222 fathoms (c 400m) at the deepest. The rift has been assumed to go on to the great depths in the Norwegian Sea, but this is not the case. It closes in the west and further out at

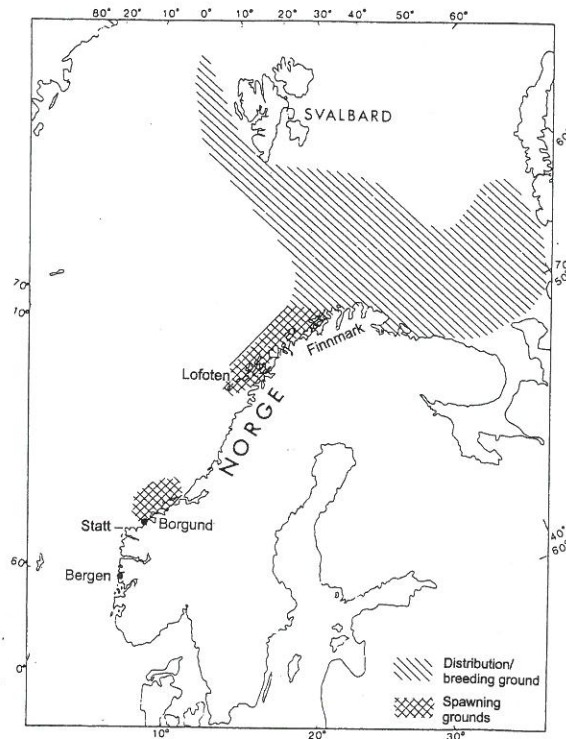


Fig 6 The extent of the fields and spawning grounds for the Norse-Arctic pelagic cod (Based on Eliassen 1983: 4)

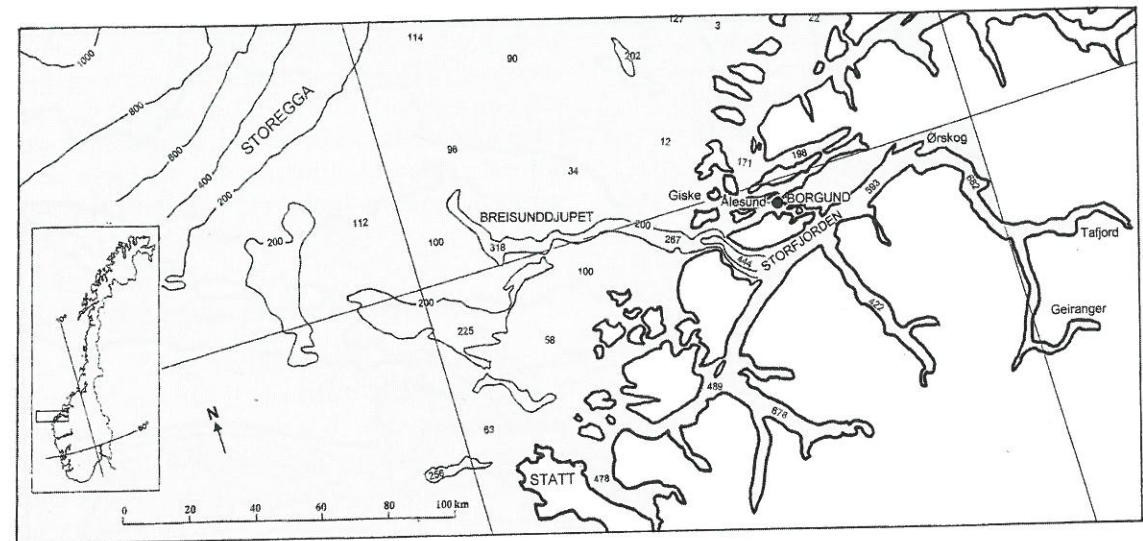


Fig 7 Sunnmøre with its many islands and deep fjords, and the continental shelf outside

Storegga there are shallow waters about 100m deep (Fig 7).

The Borgundfjord, continuing west to Hessa-fjord, adjoins the deep sound Breisundet, which forms the mouth of Storfjord (Fig 8). According to the fishermen, the cod comes in through the northern side of Breisunddjupet. The underwater slope towards Breisunddjupet is a much used fishing ground, and also described by Strøm in the 1760s (Strøm 1766: 52-53).

If the fish shoal follows Breisunddjupet it would naturally continue into the fjords Sula-fjord and Storfjord. As the fjords are deep and the currents are strong, they are not well suited for fishing. Further inland, in the bay Ørskogvika, the cod fishery is more sporadic.

The main fisheries take place in the Borgundfjord because of the favourable depths in the fjord. With depths around 100m the waters are suitable for fishing with nets and lines (cf Myklebust 1971).

The Borgundfjord fisheries are described by Strøm in his account of Sunnmøre from 1762-66. At that time the cod net was commonly used (Strøm 1762: 476). According to Strøm, the fisheries were extensive and 499 *firingfar* (big fishing boats) and 2994 fishermen took part in the Borgundfjord fisheries in 1756 (*op. cit.* 470-472). Visiting fishermen from the large fishing

grounds in southwestern Sunnmøre or further away were, however, not included in this survey. The large number of fishermen in the cod fisheries in Sunnmøre thus outnumbered the 3000 men that took part in the Lofoten fisheries in the 1660s (Dyrvik 1979: 34). The cod fisheries in Sunnmøre were, however, more unstable than in Lofoten. In a journal from 1807, when the Lofoten fisheries were at a peak, Leopold von Buch noted that the fisheries in Sunnmøre were poor. He also mentioned that the fisheries at times were almost at the level of the Lofoten fisheries (Solhaug 1976: 207-8).

At the end of the seventeenth century, the fishermen in the Borgundfjord area had the most advanced equipment along the coast for fishing cod (Fig 9). According to written sources, cod nets and long lines were first used during the rich cod fisheries in the protected waters, primarily in the Borgundfjord and to some extent further south. Documents from the early seventeenth century concerning the use and theft of long lines for cod, demonstrate that this equipment was used in the late 1600s (Nedkvitne 1988: 438-40).

The question is whether the commercial cod fisheries in the Borgundfjord can be traced back to the early Middle Ages. Was the equipment of the same type and quality as at the end of the

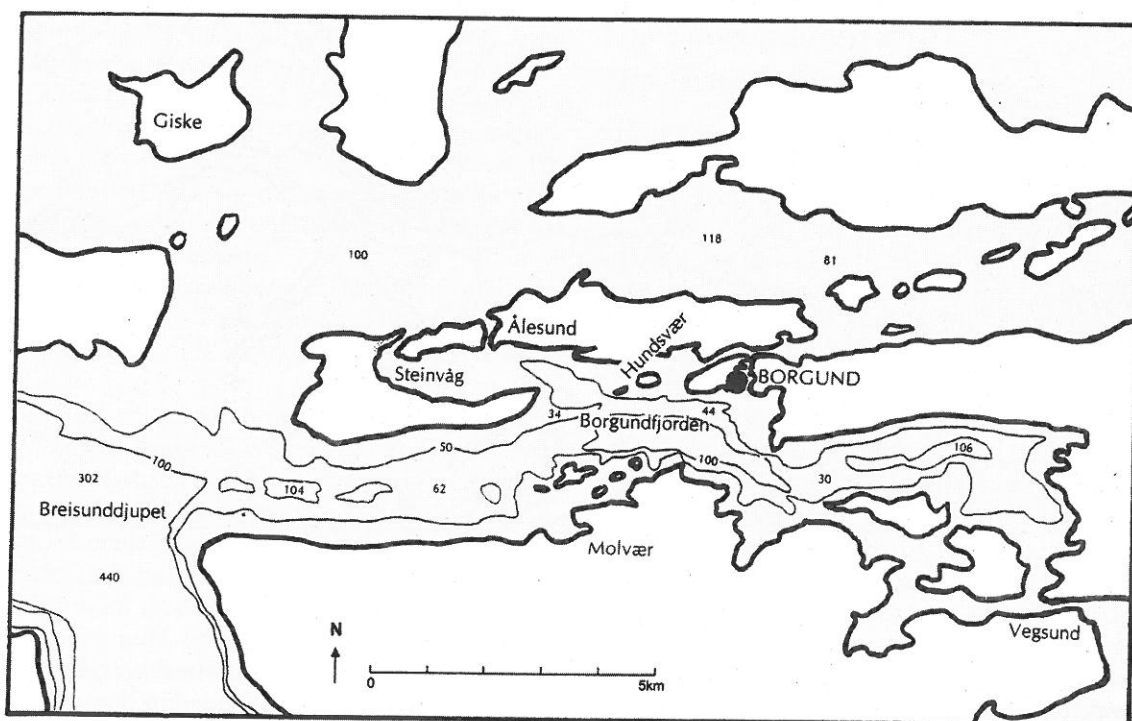


Fig 8 The Borgundfjord

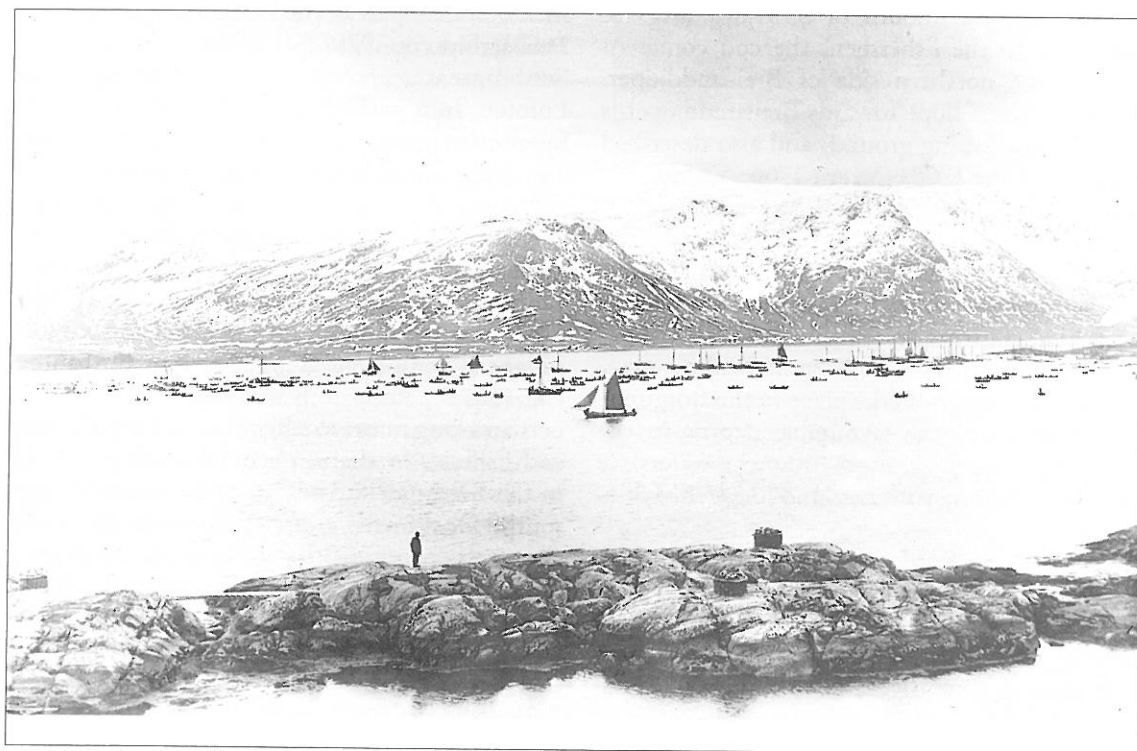


Fig 9 Cod fishing in the Borgundfjord c 1900 (Photo: Aalesunds Museum)

1600s? Were the fisheries limited to the shallow and protected Borgundfjord, or did the fishermen go further out to sea, to Storegga and the excellent fishing banks where the continental shelf drops into the Atlantic Ocean? Can the artefacts from the excavations at Borgund throw light on these questions?

Fishing Tackle From Borgund

Possible fishing methods to be traced in the Borgund material is primarily hand lines (Norw. *djupagnsnøre* or *juksa*) and troll lines (Norw. *dorgesnøre*). The two types of line consist of a line, sinker, snood and hook. The cod line was adopted from around 1600, according to written sources (Myklebust 1971: 20). Nets are known from the Middle Ages. The cod net is of particular interest as it is popularly believed, albeit mistakenly, that the inventor of the cod net, Claus Nielsen, lived in the Borgundfjord area and that it was introduced here in 1685 (Strøm 1762: 448-9). Whether cod nets were in use in the Middle Ages is rather doubtful. Assumedly nets and closing nets were used primarily for catching herring (Vollan 1960: 203-4).

Equipment for line fishing

Hooks

A hook is a more or less curved artefact made of a relatively hard material, sharp at one end and a line can be attached to the other end. The hook has two main tasks: to catch the fish with ease and secondly to hold on to the fish until it is on land or dragged into the boat.

Although the shaping of the hook has varied greatly through time according to the limitations set by the material – wood, shell, stone or metal – the main design has remained the same. However, there are variations adapted to different species, their behaviour, size, and fishing methods.

Helberg (1995: 102) emphasises the behaviour of the fish when establishing criteria for a typology. Some species approach their prey out of curiosity or irritation, some jump as they are about to bite, others suck or swallow their prey. Based on this, Helberg has drawn up the following criteria:

- Curved or straight shank
- Open bend of the hook or inwards curved hook
- Twisted hook-end in relation to the shank or straight end
- Barbed end or straight end
- Attachment for the line, eye or sheet

The shape of the shank affects the way the hook behaves in the water. Hooks with slightly curved shanks may catch some species more successfully than hooks with straight shanks. Hooks with curved shanks twist easily into a favourable position and are suitable for passive fishing, e.g. using a line. Hooks curved inwards catch fish more successfully because they penetrate the mouth of the fish with ease. Twisted hook-ends may also catch fish more successfully than hooks with straight ends. The latter are common, but many fishermen today, especially the Icelandic, prefer hooks with twisted ends when fishing with bait. These hooks are also easier to bait (Hurum 1976: 79-83).

Elements such as the length of the shank, the mouth of the hook and the length of the barb are not used as classificatory criteria. However, such elements can supply information on the size and species that were caught.

A total of 19 complete or fragmentary iron hooks have been found in Borgund (Fig 10), (cf Table 1), of which one (1/3387) is uncertain as a fishhook. All the other hooks have crosswise eyes for attaching the line or the snood. With the exception of two hooks, they all have curved shanks. All the hooks have an open bend and most of them are barbed. There are no twisted hooks.

The majority of the hooks from Borgund are classified as Helberg's type IV A (Helberg 1995: 111) or Olsen's type C (cf Olsen this volume). This is a rarely known type in the material from Northern Norway, only two hooks are found. Hooks with straight shanks and a sheet for attaching the line dominate in the north Norwegian material with a total of 253 hooks. Helberg describes this type, denoted IC, and also known as type J, as an all-purpose hook for all kinds of fishing, where the size of the hook was decisive. According to Helberg, hooks with the longest

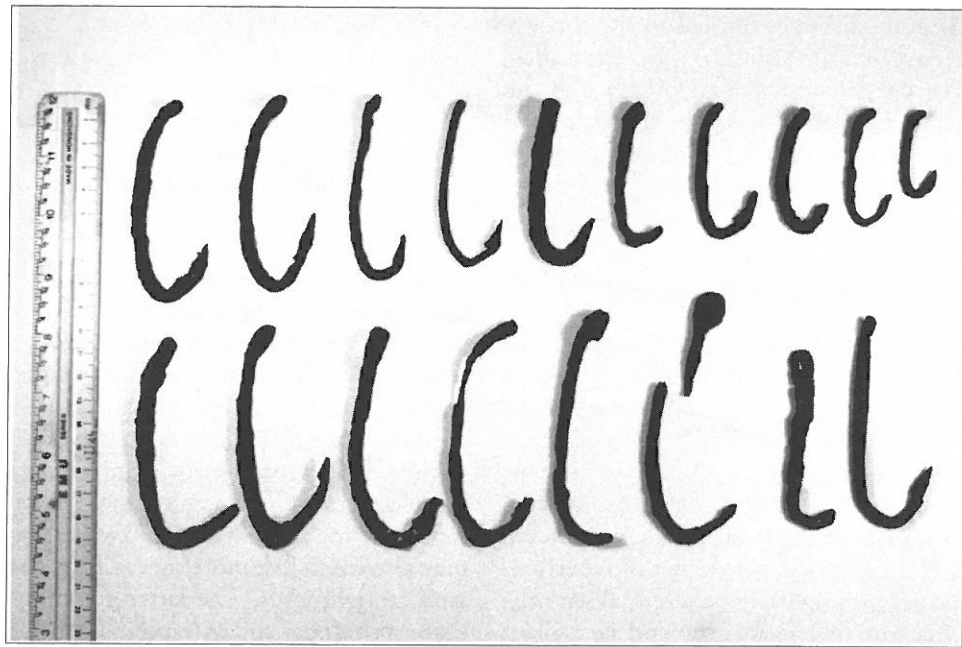


Fig 10 Fishhooks. No. 1/2710 with a straight leg, the others with curved legs. (Photo: H. Sørheim)

shanks may have been used for fishing flat fish and halibut, which have sharp teeth and are able to bite off the snood if the shank is too short (Helberg 1995: 173). Helberg's type IC hooks have been commonly used in Norway until the end of the 1970s (Dybdahl 1992: 29). In Borgund, the hook with curved shank, eye and open bend seems to have been the all-purpose hook.

The hooks from Borgund appear to be slightly bigger on average than the hooks from Northern Norway. Helberg's type IC hook measures an average of 6,8cm, whereas in Borgund, the average length of the hooks is 7,9cm. The hooks from Borgund are higher and wider than the hooks from Northern Norway and also from Bergen (cf Olsen this volume).

In conclusion, the medieval fishermen from Western Norway appear to have preferred hooks with eyes and curved shanks, whilst hooks with straight shanks and sheets for attaching the line were common in Northern Norway. The hooks are generally larger in Borgund as well. Whether this is due to regional variation or tradition, or there is a functional explanation, cannot be de-

termined. The smaller size of the hooks in Bergen may be explained by the fact that they were used mainly for fishing more stationary species in the Bergen area (cf Olsen this volume). The fisheries here were more domestic compared to the fisheries in Sunnmøre and Northern Norway.

Weights

The weights are the largest group of fishing-related artefacts from Borgund. It is not always easy to determine whether a stone was used as a weight in fishing or had other purposes. Stone weights were used on warp-weighted looms in order to tighten the warp, but may also have been used for fishing as net weights or line sinkers. I will here use the same criteria as Ole Mikal Olsen when trying to identify the different categories of weights.

The purpose of a line sinker is to bring the line and hook down to the desired depth and at appropriate speed. A heavy streamlined line sinker will make the hook sink rapidly to the chosen depth in order to prevent unwanted fish in shallow waters from swallowing the bait. The shape

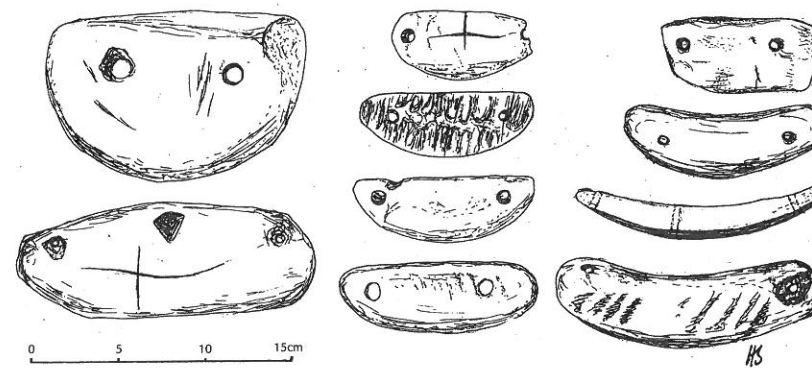


Fig 11 Sinkers for troll lines

decides whether the line moves properly in the water. A closer analysis of weight and form can give an idea of the ability to bring the hook down to the desired depth as well as the ability to cut through the waters and currents effectively.

A striking common denominator for all the weights from Borgund, is that they are made of soapstone. Only five fishing weights are made of other minerals. There were no metal or clay weights.

The archaeological material indicates that broken soapstone pots were frequently used as weights. Siri Myrvoll Lossius suggests that the majority of the soapstone vessels came from quarries in Hardanger, south of Bergen, but soapstone is also found in Sunnmøre and may have been quarried locally. Soapstone is easy to work and is particularly suitable for the production of weights. Sherds from broken pots were handy for making weights. Although it is not always possible to determine whether the weights were made of pot sherds, it must be assumed that the sherds were used as much as possible. Soapstone was also used as a building material, especially for artistic details in the window- and door openings in the three stone churches, and unused material was ideal for making small objects such as fishing weights and warp weights. The more or less exclusive use of soapstone bears witness to the abundance of this material.

Sinkers for trolling

When trolling, the line is dragged through the water behind the boat and consequently, it is

important to prevent the line from twisting. This is achieved by using an asymmetrical sinker. The suspension holes, one at each end, are placed in such a way as to obtain balance when the line is dragged through the water. Sinkers for trolling (Norw. *dorgesøkker* of ON *dorg* f.=fishing line dragged through

the water) are frequently boat-shaped, with a straight back and a curved "abdomen". The line is attached at each end near the back. These sinkers could also have been used as net weights. Nordgaard assumes that some sinkers can be defined as net weights based on the latitudinal grooves around the suspension holes (Nordgaard 1908: 84), but similar grooves have not been found on the sinkers from Borgund.

There is a total of 19 sinkers that may have been used for trolling (Fig 11). In addition, there are 8 pot sherds with two or more holes along the edges. Although they may have been used as sinkers, they are more likely to be the result of repairs and I will therefore leave them out of the discussion.

Twelve of the sinkers have an almost straight or slightly convex back, denoted as type A (cf Table 3). Seven sinkers have a concave back, shaped like a banana, and denoted as type B (cf Table 4). The shape causes the line to move slightly up and down in the water, but whether this was intentional, is uncertain. Only two type B sinkers seem to have been given the shape intentionally, while five sinkers were made of fragments of soapstone vessels, where the shape of the vessel determined the shape.

The weight of type A sinkers varies from 90 to 637g, with an average of 235g. Two sinkers stand out by being heavier than the rest, weighing 518 and 637g. Excluding these two sinkers, the average weight of the remainder is 167g. The smallest type B sinker weighs 45g, while the largest one weighs 454g. The average is 152g. According to Nordgaard, these sinkers appear to be found

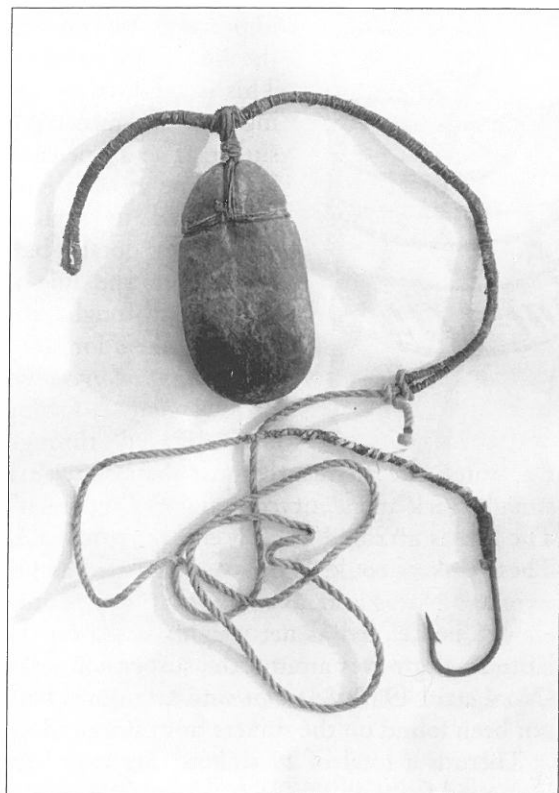


Fig 12 Deep bait line used for fishing halibut until the 1930s. Uksnøy, Haram, Møre and Romsdal (Photo: H. Sørheim)

only locally in Western Norway (Nordgaard 1908: 95).

On the whole, the troll sinkers from Sunnmøre are heavier than the sinkers from Northern Norway; the latter generally weigh less than 100g, although some sinkers weigh about 350g. These may, however, have been used as net weights (Helberg 1995: 179).

Deep bait line

The hand line is commonly known as deep bait line (Norw. *djupsagnsnøre*, ON *djúpshöfn* f. =fishing line, deep bait line). In Northern Norway it is called *juksa* (Aasen 1918: 108). The shape and weight of the sinker is adapted to the desired depth of fishing as well as the currents. An important factor in terms of the sinker's ability to sink rapidly, is that unwanted fish in

shallower waters may swallow the bait before the hook reaches the desired depth. There is not the same need to prevent the line from twisting, so the sinkers are symmetrical. These sinkers can also be used as net weights.

The simplest type of sinker is a stone with a latitudinal or longitudinal groove for the line. Only one sinker of this kind has been found in Borgund, weighing 740g (1/2858). An oval, flat stone with a latitudinal groove around the edge was heavier, weighing 909g (1/58/384). In terms of shape and raw material, these sinkers stand out from the rest.

Three long sinkers or fragments of sinkers have grooves stretching from the edge to a hole in the middle, similar to Nordgaard's Fig 50 "deep bait sinkers from Northern Norway" (Nordgaard 1908: 92) and Helberg's type IV (Helberg 1995: 117) (Fig 13). In Northern Norway, this type is known as *jarnstein* or *jarstein* (ironstone) (Nordgaard 1908: 90). They were probably used exclusively for the hand line (Norw. *juksa*) for cod and other deep-sea fish. The sinkers from Northern Norway are large and heavy, weighing 1200–2103g for Helberg's type III, which are long sinkers with latitudinal grooves but no holes, and 300–1500g for Helberg's type IV, which has a longitudinal groove (Helberg 1995: 178). The only complete sinker from Borgund that is comparable to type IV weights 432g and is small compared to the sinkers in the north. It is, therefore, unlikely that it was used for fishing in deep waters.

Only one example of the northern jarstein of Helberg's type III (*ibid*: 117) has been found in Borgund: a long sinker with a deep encircling groove and a longitudinal groove. Weighing 1299g, this is one of the heaviest sinker from Borgund (cf Table 6). Nordgaard compares this type to a sinker from Shetland, where the line is attached over the head and the snood is tied around the stone, in order to prevent the snood and hook from intertwining with the line.

At a later stage an iron wire was used in order to avoid this problem. A slightly curved wire was attached to the sinker with a leather cord and a lead weight was welded directly on to the wire. Strøm depicts a line sinker of metal where the wire seems to have been replaced by a thick plait-

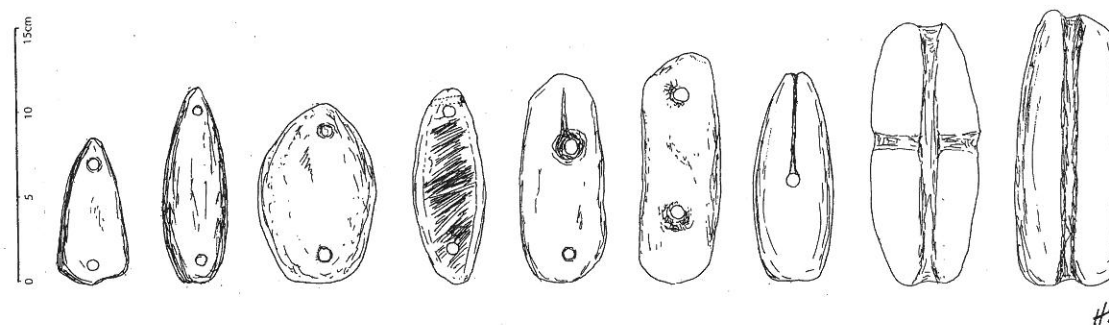


Fig 13 Sinkers for deep bait lines

ed rope (Strøm 1762: Fig 9). This is the earliest recorded example of this type that I know of.

A comparable heavy wired sinker where baleen is used as wire, is found from Uksnøy, Haram in Sunnmøre (SM 12285). This is an oblong stone of the northern jarstein type (Helberg's type III), and was used until 1931 for fishing halibut (Fig 12).

The largest group of sinkers that have been used as deep bait sinkers, are long and straight stones with a symmetrical axis and holes in the ends. They are similar to the troll sinker, but are less stable in terms of preventing the line from twisting. Nordgaard argues that the line was attached to one of the holes, while the snood was attached to the other, thus providing the simplest type of line. They may, however, also have been used as net weights.

The 15 complete examples from Borgund

(Table 2) vary in weight from 105 to 1380g. The latter, as well as two sinkers weighing 828g and 966g respectively, differ from the rest in weight. Disregarding the three heavy sinkers, the average weight of the remaining complete sinkers is 222g, considerably less than the northern jarstein.

With a few exceptions the weight of the deep bait sinkers is so small that they were probably not used for fishing deep-sea fish. It is likely, therefore, that the sinkers were mainly used for fishing in the shallow Borgundfjord.

Line runners

The only line runner found in Borgund is fork-shaped and fastened to the gunwale by a wooden peg (Fig 14). It was made of bone and was used when pulling in the line in order to protect both line and gunwale. There are no traces of the rolling line runner, which has a rotating cylinder for pulling the line across. Helberg found that this line runner was adopted at the same time as the heavy jarstein from the eleventh to the thirteenth century and it is one of the technological changes in the Middle Ages.



Fig 14 Line runner made of bone

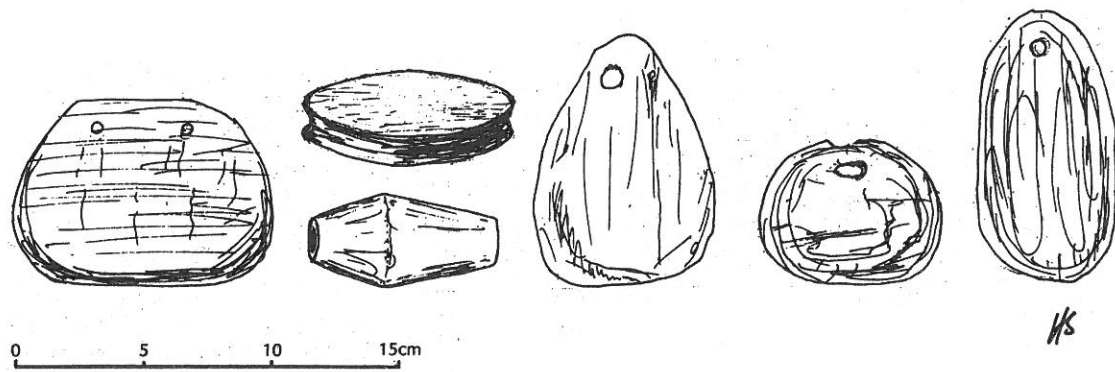


Fig 15 Floats made of wood and pine bark

Equipment for fishing with nets

Nets and closing nets are mainly used for fishing salmon and herring (Vollan 1960: 327).

Floats

In total eight floats of four types have been found at Borgund (Fig 15):

- A) wooden, pear-shaped with a hole in the end (3)
- B) wooden, round discs with a groove around the edge (3)
- C) wooden, bag-shaped with a triangular section and two holes on the edge (1)
- D) pine bark, long and flat with a hole at the end (1), or round with a hole near the edge (1)

Net weights?

According to Nordgaard's classification, only one of the weights from Borgund – a barrel-shaped weight (1/57/418) with a longitudinal whole, weighing 233g, can be classified with certainty as a net weight. A marble ball (1/57/418) may also have been part of the fishing tackle. The heavy weight, 3,55kg, indicates that it was an anchor stone for a long line or net, a so-called *ilestein*.

As Ole Mikal Olsen has pointed out (cf Olsen this volume), it can be rather difficult to distinguish between warp weights and net weights if the weights are not found in a clear finds context,

but as the excavated area is close to the sea it is likely that nets and other equipment were stored, thrown away or lost here. The archaeological material from Borgund comprises 129 weights of soapstone that may either have been used as warp weights and/or net weights. Most of them are flat and pear-shaped, but the shape ranges from round to more cylindrical weights (Fig 16). The finishing also varies, ranging from fragments of vessels with a hole to neatly polished weights.

As none of the weights from Borgund have been found in a clear context as far as function is concerned, I will look closer into the weight. As Olsen already has shown, a weight class of 100–500g should be a reasonable weight for medieval net sinkers. Without going into a discussion of the individual weights, the average weight of the stone weights from Borgund is considerably less than that of the weights from e.g. Oslo, which is 813g (Rui 1991: 119), and probably mostly used as warp weights. I find it likely that the weights from Borgund could also have been used as net weights when available, in the same way as any suitable stones that could easily be attached to nets were used.

Needles and knotting peg

Two wooden needles may have been used for netting or repairs, while a flat wooden peg with one convex side has been interpreted as an equipment for knotting the mesh (Norw. *re* or *kjolve*) (Herteig 1957: 447) (Fig 17). If this interpreta-

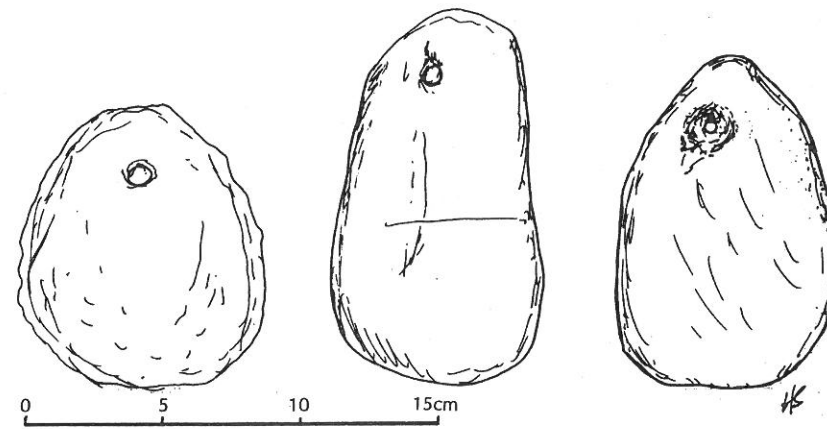


Fig 16 Weights of soapstone from Borgund – warp weights or net sinkers?

tion is correct it would give a mesh of 2,5 cm measured from knot to knot, the same as in a modern herring net.

The director of the Borgund excavations, Asbjørn E Herteig has earlier claimed that fishing with nets must have been a widely used technique in Borgund (Herteig 1957: 421).

Harpoons

A harpoon or fish spear measuring 9,4cm was found in Borgund. It has two barbs and a ferrule (Fig 18). Nordgaard has also identified similar objects as harpoons (Nordgaard 1908: 108). Its fairly modest size indicates that it was used for harpooning fish or possibly to catch seal.

Fish bones

The osteological material collected between 1954 and 1962, a total of 24,593 fishbones, has been identified by Kaare Sunde at the Zoological Museum in Bergen (Sunde 1972). As the soil was not sieved, only larger and visible bones were collected. Bones from small fish, such as herring,

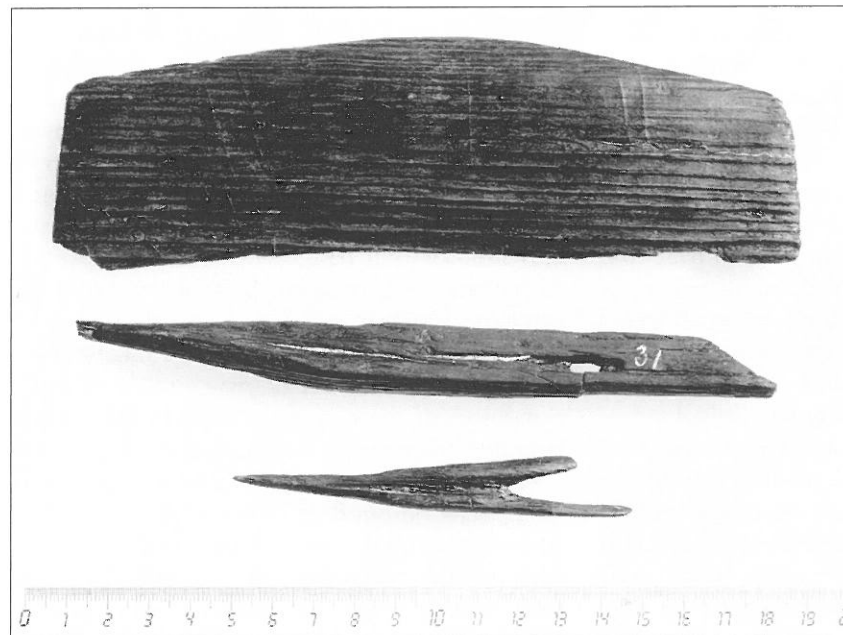


Fig 17 Top: Wooden peg (Norw. "re" or "kjolve") for knotting the mesh in nets. Below: Netting needles (Photo: S. Skare, Bergen Museum)

are therefore completely lacking. Three species dominate: cod (16%), saithe (32%) and ling (51%). The large quantity of ling is striking. Ling is caught particularly at depths between 100 and 400m at Storegga, but there is also plenty of ling in the deep mouths of the fjords. However, the depth requires long lines with heavy sinkers, which have only to a small extent been found in Borgund. The low percentage of cod could possibly be explained by the fact that cod as dried stockfish was a commodity for export and was not consumed in any great quantity at Borgund.

However, as stockfish was also made of ling, it is difficult to explain the difference in quantity between the two. A dominance of bones from fish heads would have indicated production of stockfish (Perdikaris 1998; 1999). If this had not been the case, it would have meant that the production of stockfish took place along the fjord, while the fish was stored and traded in Borgund. As the bone material from Borgund has not been collected systematically and analysed more thoroughly, this question cannot be illuminated any further.



Fig 18 Harpoon or fish spear
of iron found in Borgund,
length 9,4cm
(Photo: H. Sørheim)

CONCLUSIONS

The fishing tackle found in Borgund, and the location and orientation towards the sea, indicate that the place to a large extent was based on marine activities and maritime communications. The main reason for Borgund's development to more than a local centre and fishing village, should be sought in the trade in stockfish. The remains of warehouses from the thirteenth and fourteenth centuries indicate that Borgund was an important staple place storing large quantities of goods at that time. The rich and powerful Giske chieftains and noblemen seem to have taken part in the trade and probably organised the fisheries as well. The three twelfth century stone churches also reflect the economic strength of the Borgund area at an early stage. The church may also have played an important role in the production and trade of stockfish.

The stockfish was brought to Bergen for further export, as was the case with fish from Northern Norway. In 1177, King Sverre met the "Vågan fleet" en route to Trondheim. This confirms that the fishermen in the north brought their goods to Vågan, and the goods were taken from Vågan to Trondheim and Bergen by boat. A similar organisation could have existed in Borgund in the twelfth and thirteenth centuries. It is, therefore, relevant to relate the origin and development of Borgund to the development of Bergen as a commercial centre, and to the rapid demographic expansion in Northern Europe and the general growth of trade in the early Middle Ages. It should also be taken into account that Borgund was located closer to the market than Lofoten. The extent of the medieval stockfish export from Borgund is, however, unknown. In the 1700s there were as many fishermen in the Borgundfjord area as there were in Lofoten a hundred years earlier, and suggests the potential of the fisheries in the area.

The troll lines found in Borgund were probably used first and foremost for fishing saithe and cod, intended for domestic consumption. The deep bait line was, however, probably used for the winter and spring fisheries. Based on the fishing-related finds from Borgund, it has been claimed that the net was an important equip-

ment in the Middle Ages (Herteig 1957: 447; Vollan 1960: 203). To my mind, this is taking the evidence too far. The finds of eight floats, two needles, a few net sinkers and a possible peg, cannot substantiate the use of cod nets.

The light deep bait sinkers bear witness to fishing in shallow waters, most likely in Borgundfjord, which excludes the possibility that fishermen from Borgund fished in deeper waters, for instance the Storegga. In shallow waters, at depths of 50–125m, the shape of the sinkers might be less important, and the possibility that stones shaped like the classical warp weights could have been used as sinkers as well should not be overlooked. It is even likely that weights weighing less than 500g, were used as net sinkers when available.

Because of the large quantities of bones from ling, several historians have suggested that ling was fished at Storegga (Sulebust 1981: 273; Nedkvitne 1983: 365). Based on the archaeological material and historical documents, I find it more likely that it was caught in the deep fjords in the area, where there was plenty of ling. Ling could be caught all year round and is a more stable resource than cod, which comes to spawn during the few short winter months. This may perhaps explain the difference in quantity between bones of ling and cod. Cod may also to a larger extent have been produced as stockfish for export. Due to the unsatisfactory collection of the bone material, it is difficult to decide whether stockfish was produced in Borgund itself.

In Northern Norway, the introduction of heavy deep sea sinkers (*juksa*) and line runners with moving rolls to pull the line over are dated to around 1000–1200 AD. Helberg links these technological changes to the commercial fisheries, the trade in stockfish and professionalisation of fishing (Helberg 1995: 192, 218). Since line runners also have been found in Bergen, they should be expected to have been used in a wider area. However, corresponding equipment has not been found in Borgund.

The lack of heavy sinkers of the jarstein type in the fishing tackle from Borgund could be explained by the fact that fisheries in the Borgund-

fjord took place in shallow waters. However, as the growth of commercial fisheries in Norway coincided with the emergence and development of Borgund as an urban centre, I find it likely that this happened as a result of the development of the commercial fisheries.

It is reasonable to believe that medieval fishermen and crofter-fishermen travelled from the district to take part in the Borgundfjord fisheries in the same way as is known from the seventeenth and eighteenth centuries. They would have required seasonal lodgings. The fishing villages Hundsvær and Molvær may have had such a function. Similarly, it can be assumed that Borgund was crowded with fishermen during the season.

The distance between the farms and fishing grounds was probably shorter in Sunnmøre than in the north. The fishing season was also shorter, compared to Lofoten. The social organisation of the fisheries in Sunnmøre differed from that in Northern Norway with less fishing stations. The many farms on the islands along the coast could provide lodgings for visiting fishermen so there was not the same need for fishing stations as in the north.

Borgund declined as a central place and was deserted by the late Middle Ages. The decline started as early as the fourteenth century. The Black Death in 1349–50 and the following epidemics must have been catastrophic for the place and the activities there. 67% of all the farms in the district were deserted in the late Middle Ages. The Church as a proprietor was also affected and as a result the economy of the ecclesiastical centre of Borgund suffered.

The fluctuations in the fisheries are also a factor that should be considered. In later periods, we know that the fish was absent for shorter or longer periods. Such fluctuations may also have taken place in the Middle Ages. There are several and rather complicated reasons for the fluctua-

tions, such as climatic changes and changes in currents. Cod is extremely sensitive to changes in temperature. Although it cannot be ascertained, a colder period could have influenced the fish and the fisheries in the Borgundfjord in the late Middle Ages, and could thus have contributed to the decline of Borgund.

According to written sources, trade was reorganised in the late Middle Ages. A decree from the 1290s prohibiting foreigners to sail further north than Bergen, was lifted in the mid fourteenth century. As the foreign merchants, particularly the Hansa merchants at Bryggen in Bergen, were able to give credit, the fishermen began to take stockfish directly to Bergen, instead of delivering it to Borgund. A document issued by king Olav Håkonsson in 1384 reacted upon the new situation, and instructed people to maintain old traditions: people from Finnmark and Hålogland should sail with their goods to Vågan, people from Namdal, Nordmøre and Trøndelag to Trondheim, people from Romsdal to Veøy, and people from Sunnmøre to Borgund, "as they had always done". This instruction seems to have failed and Borgund eventually became redundant as a staple. The reason may have been that the Black Death broke up old trade patterns, as claimed by Johan Schreiner and Alf Kiil. Arnvad Nedkvitne, on the other hand, argues that the reorganisation can be explained by the higher prices and competition for fish as a result (Nedkvitne 1983: 282). The shallow harbour can also have become a problem for bigger cargo vessels in the late Middle Ages.

Borgund was deserted around 1500, but the Borgundfjord fisheries continued. Borgund's role as a staple for stockfish en route to Bergen was gone. However, local trade and craft activities were carried on around the Borgundfjord until the development of the new town of Ålesund in the nineteenth century.

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Hooks

No.	Length	Height	Width	Weight	Material	Hook	Shank	Barbs
1/57/49	9.5	3.9	3.1	16.1	Iron	Open	Curved	Yes
1/57/122	5.3	2.0	2.7	3.5	Iron	Open	Curved	Yes
1/57/442	8.4	2.1	2.5	17.5	Iron	Open	Curved	?
1/58/254	9.0	1.8	4.1	12.3	Iron	Open	Curved	?(broken off)
1/59/576	9.3	1.9	4.0	14.9	Iron	Open	Curved	Yes
1/59/626	6.9	1.9	2.8	9.8	Iron	Open	Curved	No
1/59/709	9.1	0.6	2.5	10.3	Iron	Open	Curved	?(broken off)
1/59/711	8.8	2.5	5.5	7.1	Iron	Open	Straight?	No
1/59/910	5>				Iron			?(broken off)
1/59/1363	8.5	2.5	3.4	3.4	Iron	Open	Curved	Yes (?)
1/60/1596	7.8	1.9	2.5	1.9	Iron	Open	Curved	Yes
1/60/1472	3.7	1.2	1.5	0.7	Iron	Open	Curved	Yes
1/1999	7.6	3.0	2.4	5.4	Iron	Open	Curved	Yes
1/62/2638	6.1	1.9	2.1	3.5	Iron	Open	Curved	?(broken off)
1/62/2710	9.0	2.1	3.4	12.5	Iron	Open	Straight	Yes
1/62/2734	7.1	2.0	2.6	3.6	Iron	Open	Curved	Yes
1/63/2829/1	9.5	2.4	3.7	9.3	Iron	Open	Curved	Yes
1/63/2829/2	10.9	1.9	3.9	12.0	Iron	Open	Curved	?(broken off)
1/63/3310	8.3	3.3	3.3	9.6	Iron	Open	Curved	Yes
1/63/3043	5.2	1.5	2.1	3.6	Iron	Open	Curved	?(broken off)
1/64/3387	7.5	0.9	2.1	5.6	Iron	Open	Straight	Broken off?
Average	7.9	2.1	2.9	8.1				

Table 1. Hooks

Sinkers

No.	Length	Width		Weight	Material	From vessel?	Note
No number 10	11.5	6.7	2.3	314	Soapstone	Yes	
No number 21	10.1	3.7	2.4	148	soapstone	yes	The holes diverge 45°
1/57/168	14.1	4.4	1.7	178	soapstone		
1/57/423	10.2	3.6	2.7	133	Stone		Broken at one hole, replaced by new hole
1/58/83/1	12.1	5.0	2.7	225	soapstone		Big and small hole
1/58/277/1	9.5	3.8	2.6	160	soapstone		Broken at one hole
1/1654	12.0	4.2	2.1	180	soapstone	yes	Extra hole at one end at an angle to the other holes
1/2288	15.4	6.5	2.4	425	Soapstone	yes	
1/2592	20.1	8.3	6.0	1380	Soapstone		Grooves from hole
1/2662/2	>8.2	4.1	1.9	>74	Soapstone		Broken. One half preserved
1/2877	14.9	8.9	5.5	966	Stone		Naturally shaped stone
1/4398	10.7	7.2	3.6	336	Soapstone		Oval
1/4427	8.6	4.2	1.8	105	Soapstone		Broken at one end
1/4748/1	11.6	4.0	2.3	163	Soapstone	Yes	
1/5860	21.1	8.00	3.7	828	Soapstone		
1/6117	13.4	4.8	3.1	293	Soapstone	Yes	
Average	13.0	5.8	3.1	389			
Average				222	(The three heaviest sinkers excluded)		

Table 2. Long, straight, with symmetrical holes along the median line at each end

No.	Length	Width	Thick-ness	Weight	Material	From vessel?	Note
1/54/148/1	9.3	4.7	2.7	177	Soapstone		
1/54/148/2	11.7	3.9	3.0	186	Soapstone		
1/54/150	11.6	3.9	2.5	170	Soapstone		
1/57/458	16.8	6.8	3.2	518	Soapstone		Unfinished hole in the middle. Cross-shaped engraving
1/58/394	14.8	9.3	2.7	637	Soapstone		
1/262/3	8.6	5.5		105	Soapstone		
1/4461/1	9.8	4.6	2.0	178	Soapstone	Yes	
1/6116	8.6	4.0	2.7	120	Soapstone		Cross-shaped engraving
1/6118	12.4	4.6	3.6	276	Soapstone		
1/6120	10.3	3.9	1.8	90	Soapstone		
1/6147	10.6	4.0	2.2	159	Soapstone	Yes	
1/6148	6.5	4.4	2.8	213	Soapstone		
Average	10.9	5.0	2.4	235			
Average				167	(The two heaviest sinkers excluded)		

Table 3. Troll sinkers type A: long and straight or slightly convex back and “abdomen”. Holes at each end near the back, weight asymmetrical along the median line.

No.	Length	Width	Thick-ness	Weight	Material	From vessel?	Note
1/54/214/1	11.4	4.4	1.9	164	Soapstone		
1/56/181	15.1	4.0	4.3	454	Soapstone		
1/2731	10.3	2.8	2.6	124	Soapstone	Yes	
1/2909	9.1	2.2	1.7	67	Soapstone	Yes	Four parallel lines crosswise on each side
1/3024	8.1	1.9	1.7	45	Soapstone	Yes	
1/3088	11.1	2.2	1.9	80	Soapstone	Yes	
1/4913	14.1	2.8	1.9	135	Soapstone	Yes	
Average	11.3	2.9	2.3	152			

Table 4. Troll sinker type B: long, concave back and convex “abdomen” (“banana-shaped”). Holes at each end near the back. Weight asymmetrical along the median line. (The shape of sinkers made of broken vessels is determined by the shape of the vessels.)

No.	Length	Width	Thick-ness	Weight	Material	From vessel?	Note
1/57/172	9.2	4.2	3.7	196	Soapstone		
1/58/342	16.0	6.0	4.8	831	Soapstone		
Average	12.6	5.1	4.3	513.5			

Table 5. Long sinker with longitudinal encircling groove.

No.	Length	Width	Thick-ness	Weight	Material	From vessel?	Note
1/57/549	16.0	6.6	6.1	1299	Sandstone		Slight depression for knot in one end

Table 6. Long sinker with longitudinal and latitudinal groove (As Heiberg 1995 type III, "jarstein").

No.	Length	Width	Thick-ness	Weight	Material	From vessel?	Note
1/2858	9.0	7.7	6.5	740	Stone		

Table 7. Globular sinker with latitudinal groove

No.	Length	Width	Thick-ness	Weight	Material	From vessel?	Note
1/56/234	>4.9	3.9	2.1	>25	Soapstone		Fragment
1/57/460	>12.5	4.7	4.3	>	Soapstone		Fragment

Table 8. Long sinker, one hole and line groove over the neck.

No.	Length	Width	Thick-ness	Weight	Material	From vessel?	Note
1/54/28/4	10.1	5.5	2.7	172.0	Soapstone	Yes	
1/54/32/1	8.2	6.1	1.9	144.0	Soapstone	Yes	
1/56/124/1	6.9	5.7	2.0	98.0	Soapstone	Yes	
1/2671	10.6	12.1	2.9	553.0	Soapstone	Yes	Broken at hole, replaced by new hole
1/2725	6.4	5.6	1.9	103.0	Soapstone	Yes	Broken at hole
1/2912	10.3	7.2	3.7	307.0	Soapstone	Yes	Rim shard with handle broken off. One large and one small hole, one hole near edge
1/3026	14.7	8.2	2.2	371.0	Soapstone	Yes	Three holes engraved cross
1/3234	13.3	8.7	2.3	42.1	Soapstone	yes	One large and one small hole

Table 9. Fragments of vessels with two holes, asymmetrical axis. Uncertain whether they are sinkers.