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The Church Topography of the Eastern Settlement and the Excavation of the Benedictine Convent at Narsarsuaq in the Uunartoq Fjord

C. L. Vebæk

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The Church Topography of the Eastern Settlement and the Excavation of the Benedictine Convent in Uunartoq Fjord

C. L. Vebæk

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Preface

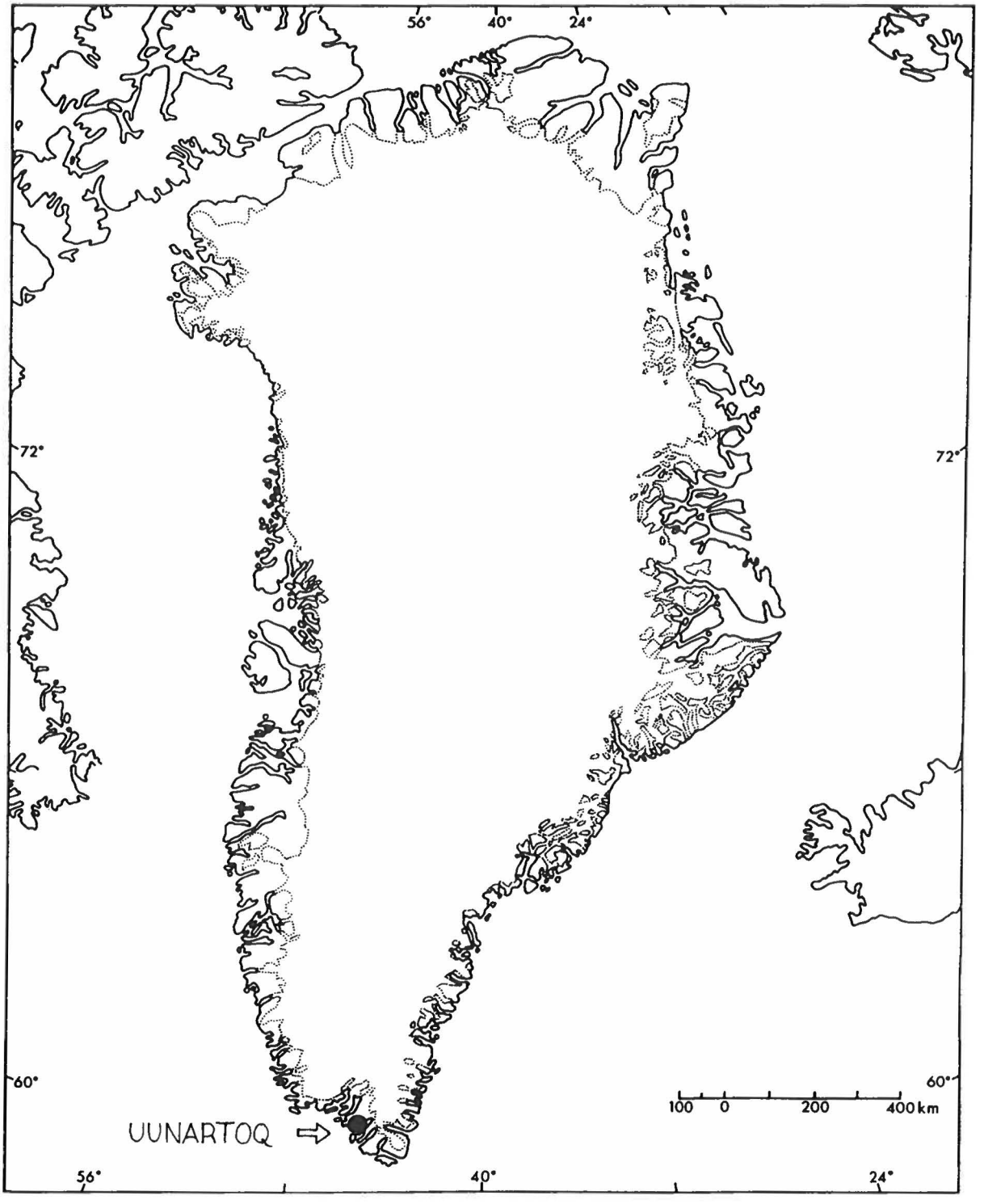
From the 1930s until as late as 1962 (with some interruptions, especially the War) I had the privilege of carrying out an extensive series of topographical and archaeological investigations of the medieval Norse settlements of South West Greenland (besides some ethnological work among old Greenlanders in several places on the west coast). Over the years I have written several short articles on these investigations, especially in the periodicals *Grønland* and *Nationalmuseets Arbejdsmark,* but also elsewhere. These were mostly written in Danish, with a few in English. One article has been translated into Swedish and Greenlandic.

However, other tasks – especially matters of Danish prehistory, as I was a keeper at Department I of the Danish National Museum from 1946 until 1983 – made it difficult for me to concentrate on my Norse material from Greenland. This situation continued for four or five years after my retirement in 1983, but I have now embarked on the final – and as far as possible complete – publication (in *Meddelelser om Grønland* in English) of my topopraphical and archaeological results from Greenland in the years 1945–46, 1948–51, 1954, 1958 and 1962. Quite naturally, I began with the work of the first few years, and I am now publishing the first of an intended series of four works in *Meddelelser om Grønland.* This deals with my excavations of the presumed Benedictine convent at Narsarsuaq in Uunartoq Fjord in 1945–46 and 1948. It is in two parts: Part I is an updated revision of the church topography of the Eastern Settlement (including the Middle Settlement); Part II deals exclusively with the excavations at Narsarsuaq and the results obtained there.

In publishing this book I must express my gratitude to a number of institutions and individuals. I want to thank the Commission for Scientific Resarch in Greenland for accepting and printing my manuscript; my old friend and former superior at the National Museum, State Antiquary Professor Olaf Olsen, for generously providing me with the means of reproducing the illustrations; my collaborators, curator Marie Stoklund and Captain Søren Thirslund, for their contributions on runic inscriptions and the sun compass; my former colleagues, curators Claus Malmros, Henrik Tauber, and Kjeld Christensen for examining some of the wooden objects found; my old friends and former colleagues Knud Krogh, H. C. Gulløv and J. Meldgaard for much good advice; and I owe special thanks to museum assistant Helga Schütze of the National Museum for making the fair copy of my manuscript. I myself and Søren Thirslund owe our best thanks to the Danish Criminal Police for valuable help in connection with the examination of the sun-dial. The photographer Mr. Lennart Larsen is to be thanked for photos of objects published here. (I should add that, unless otherwise stated, the photos and field drawings are my own work.) Finally, I want to thank Dr. N. Lynnerup very much for valuable information about the skeletal material given in sections 5 and 5a.

The National Museum, October 1989

C. L. Vebæk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The Church Topography of the Eastern Settlement and the Excavation of the Benedictine Convent at Narsarsuaq in the Uunartoq Fjord

C. L. VEBÆK

Vebæk, C. L. 1991. The Church Topography of the Eastern Settlement and the excavation of the Benedictine Convent at Narsarsuaq in the Uunartoq Fjord. – Meddr Grønland, Man & Soc. 14, 81 pp. Copenhagen 1991-04-30.

Originally, my sole intention with this publication was to give an account of the excavations I carried out in 1945–46 and 1948 on behalf of the Danish National Museum at the presumed Benedictine convent at Narsarsuaq in Uunartoq Fjord (Site No. Ø 149). To prove that this locality (discovered in 1932 by Poul Nørlund, and already then identified by him with certainty as the Benedictine convent known from Ivar Bardarson's fourteenth-century description of Greenland) really is the true site of the convent, I found it necessary to start with a close study of the church topography of the whole Eastern Settlement (including the Middle Settlement), with the emphasis on the area around Uunartoq Fjord. I have attempted to prove that the Benedictine convent actually was established at Narsarsuaq in Uunartoq Fjord, and that the church I found in 1946 at Narsaq in the same fjord is the Vagar Church of the sources. All the Norse churches of the Eastern Settlement identified up to 1946 are enumerated, and I offer some proposals as to where we might find those parish churches that are still unlocated, especially in the Middle Settlement.

Part II is entirely devoted to the initial intentions of this work: the archaeological excavations at Narsarsuaq. The excavation of the church and part of the surrounding churchyard is described in detail on the basis of a very comprehensive body of plan drawings, photos and my notebooks.

I have demonstrated that there were at least two Norse settlements at Narsarsuaq, the oldest of which may date back to the *landnáma* period, and that there existed at least one church before the one excavated, which may be dated about 1300. I have also described the many very interesting finds of all kinds made at the site, especially from the oldest phase of habitation. Marie Stoklund and Søren Thirslund have each contributed with special chapters, the former on runic inscriptions, the latter on a unique wooden artefact thought to be a compass. The skeletal material has been studied by the anthropologists N. Lynnerup, B. Brølich, V. Alexandersen and J. P. Hart Hansen, who will be publishing a separate account of this material; but N. Lynnerup has kindly informed me of the main results of their studies, published here in sections 5 and 5a.

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Part I
The Church Topography of the Eastern Settlement

An important part of the study of medieval Norse Greenland concerns the topography of the settlements, especially the location of the churches. One of the principal aims here has been to identify the churches (and fjords) mentioned in medieval and later written sources by comparing the information in the sources with actual finds in the field. In my opinion, the most important works on the written sources are still Finnur Jonsson's paper "Grønlands gamle Topografi efter Kilderne" (1898) and his special edition of Ivar Bardarson's *Det gamle Grønlands Beskrivelse* (separately edited 1930). I consider Ivar Bardarson's description of medieval Greenland the most important source for the topography– and especially for the churches – of the Norse settlements in Greenland. Incidentally, there is no manuscript from Ivar Bardarson's own hand. When Ivar Bardarson returned to Norway from Greenland (where he had been a sort of steward to the Bishop in Gardar from c.1340 until c.1360) he told others about Greenland, and there are several manuscripts by various persons where we can find Ivar Bardarson's description of Greenland.

This may be the appropriate place to mention an article, "De nørrøne Stednavne i Østerbygden" (The Norse Place-Names of the Eastern Settlement) by Erik Langer Andersen, in *Grønland* 1982. This deals to some

extent with the problems of identifying the churches; but more generally it is a critical study of Finnur Jonsson's 1898 article and Ivar Bardarson's work, and claims that these sources are not as reliable as has generally been believed. I myself still think that Ivar Bardarson (although only known to us from manuscripts from about two hundred years after he lived) and Finnur Jonsson (in spite of some clear errors and doubtful theories) are still to be considered the best written sources. (Of Finnur Jonson it would perhaps be better to say that he is still the best interpreter of the old manuscripts.) But of course they must be used with caution, especially as regards the identification of the churches of the Eastern Settlement. The most important medieval manuscripts in this respect (after Ivar Bardarson's) are an actual list of the churches in the famous Flatey Book (late fourteenth century) and some manuscripts by Bjørn Jonsson (d. 1658) and Arngrimur Jonsson (d. 1648), both based on a very old, regrettably lost manuscript. After a close study of all the available written sources, Finnur Jonsson came to the conclusion that there had been a total of twelve parish churches, besides two monasteries, in the Eastern Settlement. The churches were as follows:

Herjolfsnes in Herjolfsfjord	Hardsteinaberg–Dyrnes
Vik in Ketilsfjord	Brattahlid in Eiriksfjord
Vatsdal (in the same region)	Undir Solarfjøllum (in the same region)
Vagar in Siglufjord	Isafjord
Undir Høfdi in Austfjord	Gardanes in the Midfjords
Gardar in Einarsfjord	Hvalsey Fjord Church in Hvalsey Fjord

Besides these (according to Ivar Bardarson, the only source to mention them) there was an Augustinian monastery in Ketilsfjord and a Benedictine convent in "Ramsnes Fjord". There was also of course a church at each of these sites.

I would now like to look more closely at the identifications of the above-mentioned churches. But it should be mentioned here that Finnur Jonsson (1930) thought that Hardsteinaberg and Dyrnes were one and the same church; that the church names Aros and "Pettersvigh" mentioned by Ivar Bardarson also referred to just one church; and that this church was the same as the Vik of the other written sources.

Combining the information from the old manuscripts with what had actually been found in the field, Finnur Jonsson tried in 1898, and later in 1930, to find the sites of the churches in the Eastern Settlement. But before looking more closely at Jonsson's results I should perhaps summarize what had been found up until 1930, when Jonsson edited Ivar Bardarson's description of Greenland.

In 1845, when Part III of *Grønlands Historiske Mindesmærker* was published, only five of the Norse

Fig. 1. Hvalsey Fjord Church (photo, C. L. Vebæk).

churches of the Eastern Settlement had been located: those at Ikigait, Qaqortoq, Igaliku, Qassiarsuk (now South Igaliku) in Igaliku Fjord, and the one at Qassiarsuk in Tunulliarfik Fjord. But at that time only two of the five could be identified with any great certainty: those at Ikigait and Qaqortoq, as Herjolfsnes and Hvalsey Fjord Church respectively (Figs. 1 & 2). These identifications have not been disputed since. Many years later, in 1926, Poul Nørlund found (or, perhaps more correctly, supposed he had found) a church ruin at Tasersuaq in the Tasermiut area (at Ø 140), which he identified as Vatsdal Church. And in the same year Nørlund proved the existence of a church at Tasermiutsiaq, far up the Tasermiut Fjord (the Norsemen's Ketilsfjord). Nørlund believed that the latter church could be identified without any doubt as the Augustinian monastery (Fig. 3), and this interpretation, already suggested by Finnur Jonsson in 1898, still holds good. As early as 1898, Finnur Jonsson identified the church at South Igaliku as Undir Høfdi (Ø 66), the large church at Igaliku as the episcopal seat Gardar, and the church at Qasiarsuk in Tunulliarfik (Ø 29a) as Brattahlid. The excavations done by Nørlund at Igaliku in 1926 and Qasiarsuk in 1932 finally confirmed Jonsson's identifications of the episcopal seat or "cathedral" at Gardar and the church at Brattahlid. (Figs. 4 & 5). (Nørlund 1929; Nørlund and Stenberger 1934).

This was the situation as far as the churches of the Eastern Settlement were concerned in 1932. Six out of a presumed total of twelve parish churches, and the Augustinian monastery, had been found and identified. In his publications Finnur Jonsson tried with great skill to indicate the sites of the remaining churches. The task was now to find them.

Fig. 2. Herjolfsnes. The church and part of the churchyard, with one of the coffins (photo, Poul Nørlund, 1921).

By 1932 Poul Nørlund had already succeeded in finding no less than four hitherto unlocated churches. One was at Ø 149, Narsarsuaq in the Uunartoq Fjord. Later in this work I shall return to this church, and Part II of the book will deal exclusively with the excavations at Ø 149, presumed to be the site of the Norse Benedictine convent. Nørlund also found a church just north of Narsaq (at Ø 18), and (following Ivar Bardarson) believed this was Dyrnes church. To my knowledge no one has seriously doubted this since, apart from myself: in 1966 I proposed the hypothesis that Dyrnes and the still-unlocated Hardsteinaberg church were one and the same, as Finnur Jonsson had in fact suggested in 1898. I shall have more to say about this problem later in the book. Finally, Nørlund noted the existence of two small churches, just a few kilometres apart, at Qorlortoq, in the upper part of Tunulliarfik Fjord (at Ø 33, very near the fjord, and at Ø 35, a little to the west and up the valley). The finding of these two churches (Figs. 6 & 7) posed Nørlund certain problems, but on the basis of the written sources he had no doubt that they both represented Undir Solarfjøllum church. I should mention here that Undir Solarfjøllum, according to Ivar Bardarson, was midway up Eiriksfjord, between Dyrnes and Brattahlid. But Nørlund had been unable to find any church in that region, and as he was sure that Finnur Jonsson's list of twelve parish churches was correct, the churches at Qorlortoq could only be identified with Undir Solarfjøllum. Nørlund explained the strange fact that there were actually two churches very close to each other by saying that they had not existed or been in use simultaneously; the church (and its churchyard) had been transferred at some unknown time, and for some unknown reason, from one site to the other.

After 1932 the hunt for Norse churches in Greenland ceased for some years, but for several years after World War II (from 1945 until 1962, with some interruptions) I had the privilege of undertaking topographical and archaeological excavations at the sites of the Norse settlements in Greenland. The problems of the churches quite naturally intrigued me, and I have been fortunate in being able to provide some solutions to at least a few of them. In all, I have found four churches. The one I found at Narsaq in Uunartoq Fjord (Ø 162) in 1946 should, I think, be identified with Vagar Church (more on this later in this Part). In 1950, after intensive searching, I found another church at Sillisit (Ø 23) in Tunulliarfik Fjord (Fig. 8); there had been earlier speculation

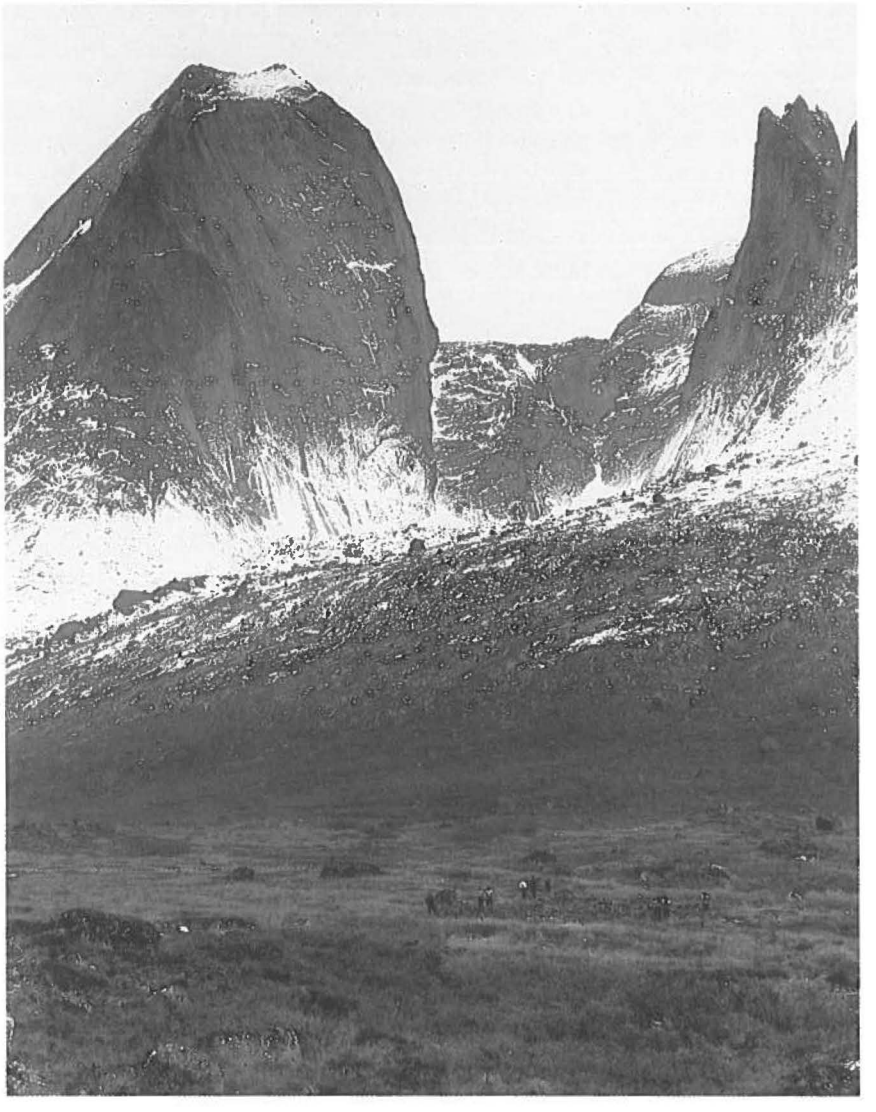


Fig. 3. The Augustinian monastery at Tasermiutsiaq, Tasermiut Fjord (photo, Poul Nørlund, 1926).

about a church there, but so far no one had been able to prove it. The view that the church now found at Sillisit must be Undir Solarfjøllum (and perhaps also Hardsteinaberg) will be discussed in more detail below. In 1951 I found yet another church at Eqaluit (Ø 78) in Igaliku Fjord (Fig. 9). This (found quite by chance, I must admit) was a real surprise, as no church was expected here, and identification with one of the remaining parish churches mentioned in the written sources was quite out of the question. So the finding of a church at Eqaluit opened up new horizons: it had now been proven that some churches in Norse medieval Greenland were not mentioned in the old manuscripts.

At the same time it became necessary to revise certain earlier identifications. It seems certain now, after the discovery of the church at Eqaluit and some later finds, that there existed a group of medieval Norse churches in Greenland whose names are unknown to us, as they do not appear in the church lists, which seem to have included the parish churches only. It has been mentioned above that Nørlund identified both the small churches at Qorlortoq as Undir Solarfjøllum Church. It can now be said that this must be wrong, partly because churches have been found that simply cannot be among the parish churches, partly because there appears to be no doubt that Undir Solarfjøllum Church was the one I found in 1950 at Sillisit; this identification fits Ivar Bardarson's description perfectly.

However, at the time just after I found the church at Sillisit I believed it was Hardsteinaberg (a natural enough supposition, as there is an abundance of the Igaliku sandstone used for whetstones by Eskimos and Norsemen alike at this site). Finnur Jonsson had already proposed that Dyrnes and Hardsteinaberg were the

Fig. 4. Gardar. St. Nikolaus' Cathedral (photo, Poul Nørlund, 1926).

same church. Since Nørlund had found Dyrnes church near Narsaq, and as there is actually whetstone material (e.g. porphyrite) in the mountain behind the church, I shared Jonsson's opinion (see Vebæk 1966: 209–11). However, I have given this question renewed consideration, and must admit that I am no longer so sure. More precisely, I will still not wholly exclude the possibility that Hardsteinaberg and Dyrnes were the same church, but think that it is perhaps even more likely that the name Hardsteinaberg and Undir Solarfjøllum designated the same church: the one I found at Sillisit. At least it seems unlikely that Hardsteinaberg was a separate church with its own parish. If it was, I must admit I have no idea where to look for it.

Finally, in 1962, I found a rather small church surrounded by an almost circular fence, not far from Under Høfdi Church, on the other side of the bay (or fjord – the Norse Austfjord), near the Norse farmstead Ø 64, at a place called Inoqquassaat (Fig. 10). I found this by studying Daniel Bruun's many excellent sketches (Bruun 1895); whenever I saw a drawing of an enclosure with a small building inside, I went if possible to the site and did some sample excavations. In most cases this produced no results, but at Inoqquassaat I succeeded, and was very soon able to prove (from burial finds inside the fence) that this had been a churchyard with a church inside it.

This church is in an isolated spot, and certainly cannot be identified with any of the still-unlocated parish churches. It must be one of the group of churches whose names are unknown, and which were undoubtedly not parish churches. The church at Inoqquassaat belongs to a group, so far comprising five or six unnamed churches, characterized by their small size, each with a correspondingly small churchyard fenced in by a circular or oval dike. These churches are certainly from an earlier period of Norse settlement, and undoubtedly belonged to the very farms near which they were situated. I quite agree with Knud Krogh's view (1976) of this special group of Norse-Greenlandic churches, perhaps with the exception of Ø 162, where the church and churchyard are of the above-mentioned type, but which I nevertheless believe must be identified with Vagar Church, one of the parish churches. But I shall have more to say on this matter later in this Part.

Since the finding of a church at Inoqquassaat, the

Fig. 5. Brattahlid. The church (Brattahlid 3) (photo, Poul Nørlund, 1932).

number of known Norse churches in the Eastern settlement has increased by two. In 1968 Krogh and Albrethsen quite unexpectedly found a church at Ø 48 on the isthmus between Eiriksfjord and Einarsfjord, not far from the episcopal seat at Gardar (Ø 47). This must belong to the group of unnamed churches described above. The church at Ø 48 is so close to the episcopal church that it seems very unlikely that the two could have existed at the same time, or at least that the one at Ø 48 could have functioned as a parish church while the "cathedral" was in use.

Finally, in 1971, S. E. Albrethsen found a church at Ø 1, Nunataaq. This is a small church measuring about 12 × 5–6 metres. Most of it has completely subsided. It is surrounded by a churchyard which, unlike those of all other known small Norse churches in Greenland, is fenced in not by a circular, but by a rectangular dike, measuring 22 × 24 metres. Sample excavations in the churchyard resulted in finds of skeletons, and also – most remarkably – of fragments of garments. Albrethsen (1972) thinks this church should perhaps be identified with Gardarnes. The church at Nunataaq is mentioned briefly by Knud Krogh (1976), but without any attempt at identification.

In the preceding pages I have given a short account of the search for Norse churches in the Eastern Settlement so far. I will now recapitulate, to show how far we have actually come today: what churches have been located, which of them have been identified with some degree of certainty, and finally which of the parish churches are still unlocated.

Following the order of the church lists, we can start from the SSE, heading WNW. First we have Herjolfsnes (Ø 111). There are no problems here: the identification of the church found at Ikigait (and excavated in 1921 by Poul Nørlund (1924)) is absolutely safe. The next stop is Tasermiut Fjord (the Norsemen's Ketilsfjord). According to some of the written sources there were two churches here, Vik and Vatsdal. Ivar Bardarson also has two churches in this area, but his names are "Pettersvigh" (Petursvik) and Aros. Besides this, Ivar Bardarson informs us of the existence of an Augustinian monastery far up the fjord. The church associated with the monastery was found in 1926 by Poul Nørlund at Tasermiutsiaq, exactly where Finnur Jonsson had predicted in 1898. The identification of this find as the monastery has not been doubted since. As for the other two churches in Ketilsfjord, it seems reasonable that Vik is the same as Bardarson's Petursvik, and that Vatsdal church and Aros church are identical. It was men-

Fig. 6. Qorlortoq (Outer Q: Ø 33). The church and churchyard (photo, C. L. Vebæk, 1950).

Fig. 7. Qorlortup Itinnera (Inner Q: Ø 35). The church and churchyard (photo, C. L. Vebæk, 1958).

Fig. 8. Sillesit (Ø 23). The site of Undir Solarfjøllum Church. The corners of the church are marked by the four surveyors' rods (photo, K. Krogh, 1964).

Fig. 9. Eqaluit, in Igaliku Fjord (Ø 78). The site of the church (photo, C. L. Vebæk, 1951).

Fig. 10. Inoqquassaat (Ø 64). View of the farm with the church and churchyard (photo, C. L. Vebæk, 1962).

tioned above that in 1926 Nørlund found (or supposed he had found) a church in this region (at Ø 140). In his opinion this was Vatsdal Church. I was at the site in the 1950s, but was unable to find any church there. However, the site is much overgrown with willow, making observation difficult. As I had no reason to doubt Nørlund, I believed it was my fault that I had not observed the church ruin. But Knud Krogh visited the site in 1968, and he too found no traces of a church (Krogh 1976). Knud Krogh is a very careful and cautious archaeologist, and does not actually exclude the church because of this. He writes (Krogh 1976: 298): "but new investigations at the place make it clear that there is not, on the present basis, enough certainty for this assumption [that there is a church]".

Personally I would go a step further, and say that Nørlund must have been mistaken here, and that there is in fact no church at Ø 140. I might add that it seems rather a strange place for a church. That there really were two parish churches in this region, not far from each other, seems indubitable. In my opinion, Vik (Petursvik) might have been situated at the farmstead Ø 139, and I have personally done much searching here, admittedly without result. The same is true of Aros Church, which I believe to have been the same as Vatsdal Church, and which must have been in the northeastern part of Tasiussaq, at Saputit. Here there are two Norse farms, Ø 108 and Ø 109, and here too I made intensive investigations without positive results. I am inclined to think that the true site is at Ø 109, where the Norse ruins are near a steep, high bank, and where the church may have fallen into the sea. On the beach just here, some fragments of church bells have been found, which certainly lends support to the assumption.

Leaving the Tasermiut region, we continue to the north west. In all the sources, the next church to be mentioned is Vagar and (in Ivar Bardarson only) the Benedictine convent. The fjord where we should look for Vagar Church and the convent is Siglufjord, but here Ivar Bardarson has the name "Ramsnes" (Hrafnesfjord). Ivar must be mistaken in this: the correct name of this fjord must have been Siglufjord, and we are able to identify it with certainty as the present-day Uunartoq Fjord. Ivar Bardarson has a most interesting and comprehensive description of this fjord, and of the position of Vagar Church and the convent: "Next after Ketilsfjord lies Ramsnes Fjord, and far up this fjord there is a convent *ordinis Benedicti*: that convent owns everything up to the innermost part of the fjord and out from Vage [Vagar], which is consecrated to Olaf Saint and King. Voge [Vagar] church owns all the land along the outside of the fjord; in the fjord there are many

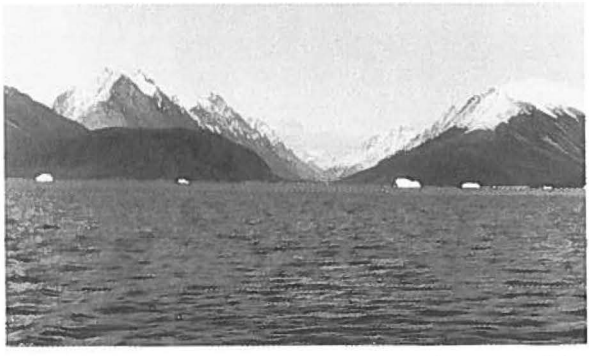


Fig. 11. Uunartoq Fjord. View from W. of the inner part of the fjord (photo, C. L. Vebæk, 1945).

small islands, and the convent owns them all, with the episcopal seat. In these islands there is much warm water, which is so hot in wintertime that no one can approach; but in summer it is moderately warm, so people may bathe there, and many people are cured of their illnesses and recover good health again".

There can be no doubt whatsoever that Ivar Bardarson is describing Uunartoq Fjord (Fig. 11), the only area in South West Greenland with warm water all year round (although only in one place, on the island of Uunartoq, which in Greenlandic means "the warm place"). One point is disputable, though: Ivar Bardarson, as we have seen, calls the fjord Ramsnes Fjord, while all the other reliable sources call it Siglufjord. But here Ivar Bardarson must simply have been mistaken.

The next question is of course whether Norse ruins, among which we might find the Benedictine convent and Vagar Church, have actually been found in the fjord. The answer to this, in my opinion, is yes. We have seen that Poul Nørlund found a church and several other ruins as Narsarsuaq (Ø 149) in 1932. Nørlund thought that this was the site of the Benedictine convent. Ivar Bardarson's topographical description, my own observations in the field and excavations at Ø 149 in 1945–46 and 1948 certainly back up Nørlund's identification. A thorough search of the whole fjord seems to confirm that Narsarsuaq (not, as Finnur Jonsson surmised, far up the fjord) is the site of the convent. There are certainly no other church ruins in Uunartoq Fjord than those at Ø 149, Narsarsuaq, and Ø 162, Narsaq, in the outer area of the fjord (Fig. 12). Narsaq is precisely where I found (during the Narsarsuaq excavations of 1946) a hitherto-undiscovered, comparatively large farm, with a small church surrounded by a churchyard fenced in by a low, but very distinct circular dike. I am convinced that this must be identified with Vagar Church. The positions of the two churches now located in Uunartoq Fjord accord well with Ivar Bardarson's description (Fig. 13). Only one thing worries me a little: the church I identify as Vagar is actually the very small type of church with a circular churchyard, six or seven of which have now been located in the Eastern Settlement. These appear to belong to a group of very old churches whose names are unknown, and which do not seem to have been parish churches. Yet I do not think we can point to any other site in this region for Vagar Church. And why should it be out of the question that one (or more) of the "safely" identified parish churches (those whose names are known) was a small one? The parish of Vagar was certainly always a small one comprising only a few farms, and the population may never have needed a bigger church and churchyard. So far, in fact, I feel sure that Ø 149, Narsarsuaq, is the Benedictine convent, and Ø 162, Narsaq, is Vagar Church (Fig. 14).

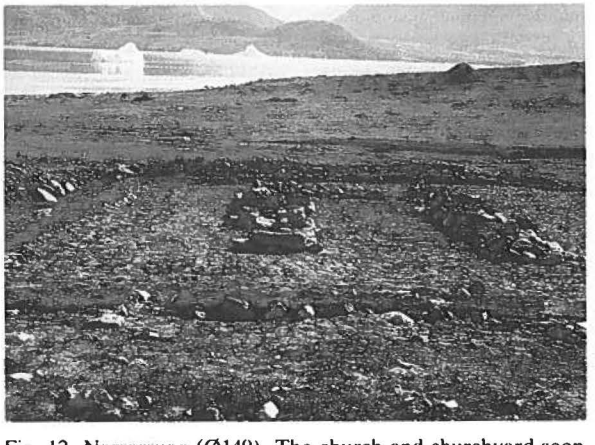


Fig. 12. Narsarsuaq (Ø149). The church and churchyard seen from NW (photo. C. L. Vebæk, 1945).

Let us continue our tour of the Norse churches in the Eastern Settlement. After Vagar, Undir Høfdi in Austfjord is mentioned in the written "sources" (Fig. 15) (but for some reason not by Ivar Bardarson, although there is no reason to believe the church did not exist in his days). As I have said, there can be no doubt as to the location and identification of this church: it is the rather well-preserved church situated at Ø 66 (Southern Igaliku), examined in 1935 by Aa. Roussell (1941). But it must be noted here that Ivar Bardarson mentions the name of another church between Ramsnesfjord and Einarsfjord: "Next comes Einarsfjord, and between this fjord and the above-mentioned Ramsnesfjord lies a big farm, which belongs to the King, and the name of that farm is Foss; and there is also a costly church consecrated to St. Nicholas, and nearby there is a big lake, full of big fishes..." I agree with Knud Krogh (1982: 128–29) that this church may be the same as Undir Høfdi Church.

Next comes Hvalsey Fjord Church (Ø 83), whose identification is as safe as any: it is the extremely well-preserved, beautiful church near Qaqortoq (Julianehåb); the Greenlandic place name is Qaqortukolooq. This church has been measured and drawn several times, especially by Mogens Clemmensen in 1910 (1911)

Fig. 13. Map of the Uunartoq region. Norse farms are indicated by a circle, churches with a cross (reproduced from K. Krogh 1982).

and Aa. Roussell in 1935 (1941). Nor is there any problem at Igaliku, where we have the ruins of the episcopal seat at St. Nikolaus' Cathedral, excavated in 1924 by Poul Nørlund (1929).

We now leave Einarsfjord (Igaliku Fjord), with Gardar and Undir Høfdi, and go on to Eiriksfjord (the present-day Tunulliarfik). Here we should find Hardsteinaberg/Dyrnes, Undir Solarfjøllum and Brattahlid (Leyder) Churches. The problems of identifying these have already been discussed. If we follow Ivar Bardarson (still, in my opinion, the most reliable source) we should find Dyrnes Church on our left as we sail up the outer fjord. Dyrnes Church was undoubtedly the church found by Poul Nørlund at Ø 18 in 1932. It may also have been called Hardsteinaberg, as I have argued before (Vebæk 1966); but I must admit that I am not so sure now. Hardsteinaberg is equally (or more) likely to have been the church I found at Sillisit (Ø 23) in 1950, identified in the first instance as Undir Solarfjøllum. I do not think that Hardsteinaberg should be considered a separate church with its own parish. If it was, I do not know where it is to be located.

After Undir Solarfjøllum comes Brattahlid, whose identification is beyond discussion. But it should be mentioned that three churches have actually been found at Brattahlid (Ø 29). One of these (Brattahlid 3) was built on the site of an older church (Brattahlid 2) (Krogh 1976); and a very small church known as "Tjodhilde's Church" (Krogh 1965, 1976), because it may be the one mentioned in the sagas as having been built by

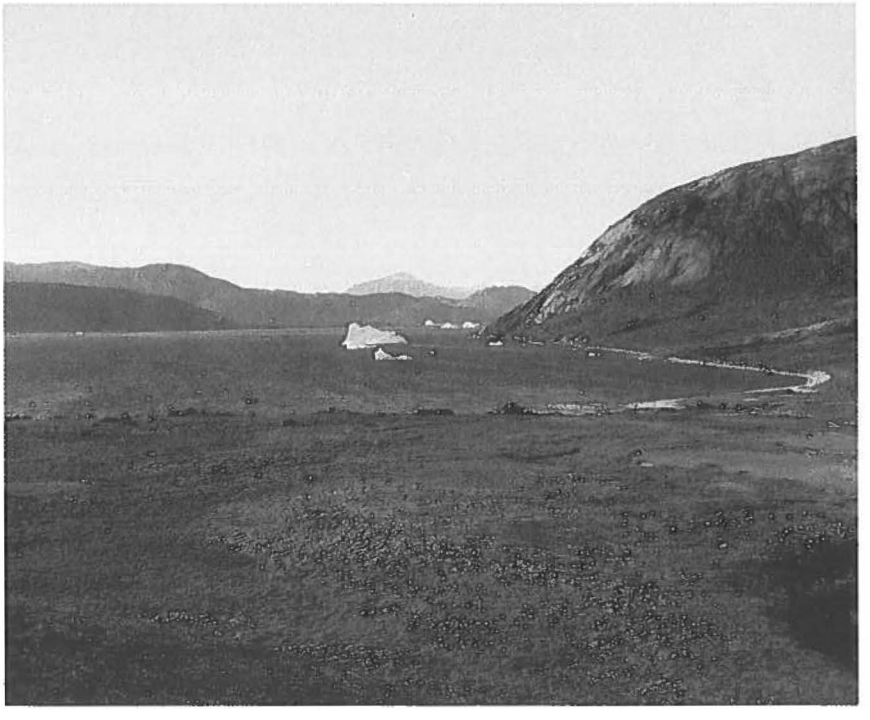


Fig. 14. Vagar (Ø 162). A view of the bay from the SE. The church is seen in the foreground, to the right (photo, C. L. Vebæk, 1946).

Eric the Red's wife Tjodhilde, has also been found at Brattahlid (Fig. 16).

Finally in this fjord we have the two small churches at Qorlortoq – quite certainly not parish churches, but local farm chapels (*bænhus*).

We have yet to discuss two of the churches known by name (and which we must suppose to have been parish churches): Isafjord and Gardarnes in the midfjords (*miðfirðir*). These are not mentioned by Ivar Bardarson, perhaps because they no longer existed or were no longer used in his time (the mid-fourteenth century). The fjord north of Tunulliarfik is perhaps the Norse Isafjord. If so, as mentioned above, the church found at Ø 1 may have been Isafjord Church. But I will venture to suggest another possibility: that the "midfjords" were actually the complex of fjords we now call the *Mellembygd* or Middle Settlement, lying between the Eastern and Western Settlements. But the farms in this region have always been seen as a part (although remote and isolated) of the Eastern Settlement. Before pursuing this hypothesis, however, we must consider the fact that there was a "midfjord" in the Eiriksfjord region. Ivar Bardarson says that "midfjord" is owned by Undir Solarfjøllum Church. I think "midfjord" here must mean the stretch of land in the middle of the fjord; and this fjord is Eiriksfjord! But the same name, in the plural, is in my view a very good description of the farms in the Ivigtut-Arsuk region. It would make very good sense if the *miðfirðir* were simply the fjords (with Norse settlement) situated between the Eastern and Western Settlements. That there actually was at least one parish church in the region we now call the Middle Settlement is proven by a tombstone with a runic inscription (Fig. 17) found in 1913 on the small island of Napassut, south of Ivigtut (M6a). The tombstone had been used as building material in an Eskimo house, and must have been brought here from a Norse churchyard on the

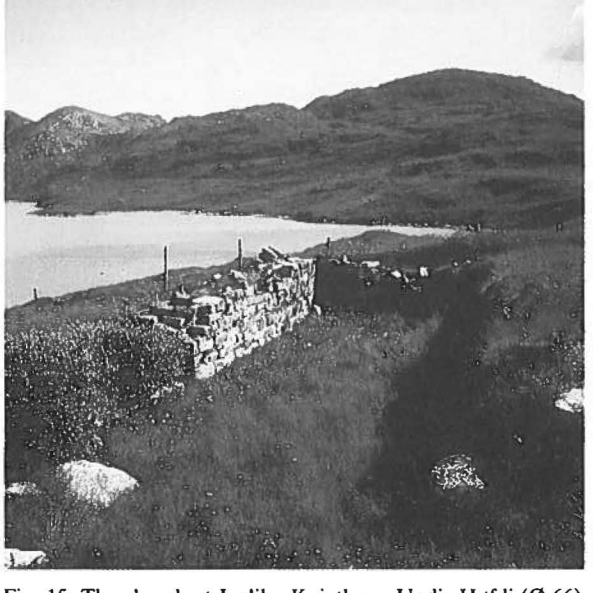


Fig. 15. The church at Igaliku Kujatleq – Undir Høfdi (Ø 66) (photo, C. L. Vebæk, 1962).

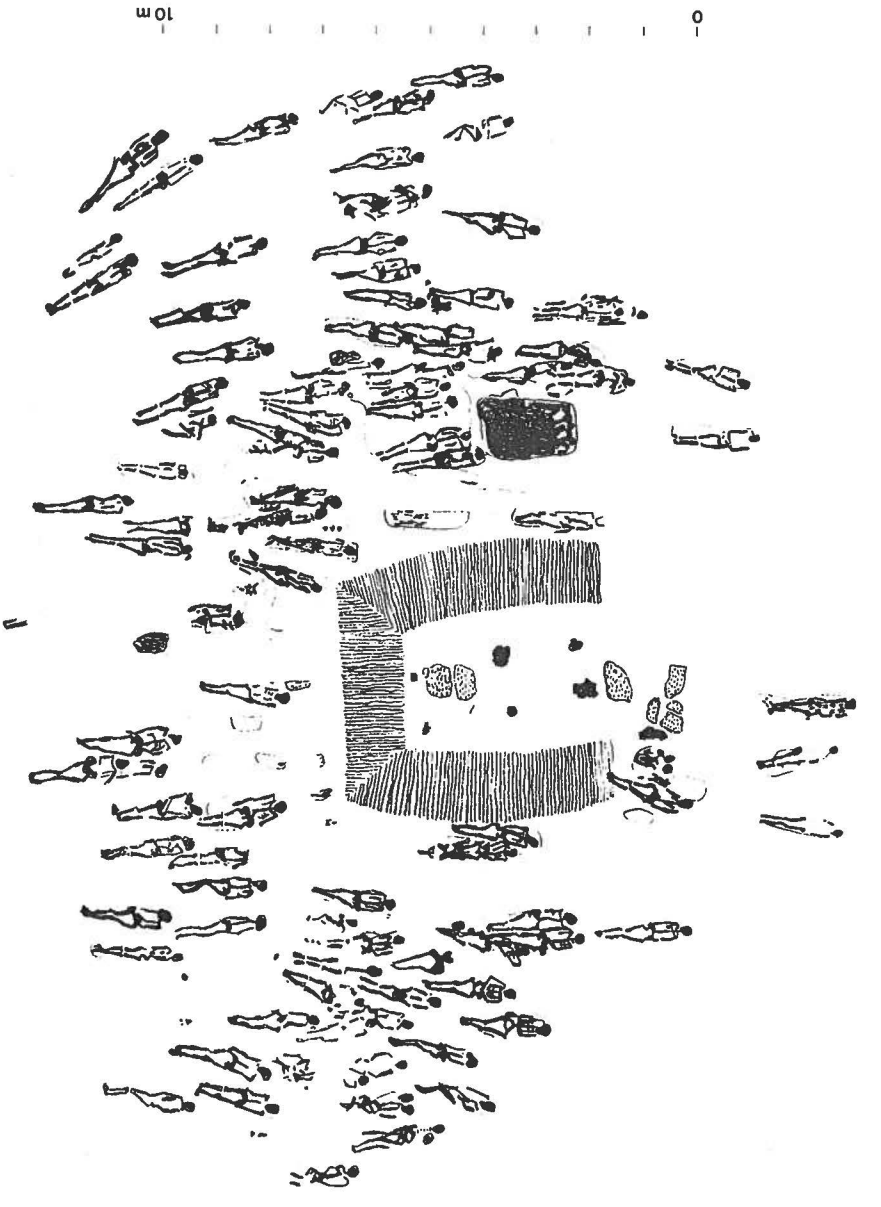


Fig. 16. Tjodhilde's Church at Brattahlid (drawing by S. Havsteen-Mikkelsen, reproduced from K. Krogh 1982).

Fig. 17. Tombstone, with a runic inscription, from the island of Napassut (M 6a) in the Middle Settlement. (Length 51 cm).

mainland. I have searched in many parts of the "Middle Settlement" for a church (or two), but in vain. In my opinion there may be a chance of finding a church at Grønnedal (M21) at Farm M2, far to the south, or at Farm M1, at the lower end of Kornoq Fjord. Both the latter fjord and the fjord where Grønnedal is situated have glaciers, and either could have been called Isafjord. At M2 local conditions suggest that Gardanes Church could have been situated here. I once proposed the hypothesis that Isafjord and Gardanes Churches should be sought in the "Middle Settlement" (Vebæk 1956), but returned to the theory that they should be sought in Northern Sermilik, north of Tunulliarfik Fjord. Finnur Jonsson (1898) was convinced that the *miðfirðir* were the three small fjords on the eastern side of Sermilik: Kangerdluak, Tasiusarsuk and Tasiusak. Accordingly, I also searched the whole Sermilik region for churches, but to no avail (Vebæk 1966).

To return to the hypothesis that the *miðfirðir* may have been what we now call the Middle Settlement, the fact that Ivar Bardarson does not have the two "missing" churches may mean that when he was in Greenland (apparently as an official – a steward attached to the episcopal seat in c. 1340–1360) the Norse settlement around Arsuk-Ivigtut had just been abandoned by the Norsemen and was immediately taken over by the Eskimos. Certain archaeological indications (to which I will return) suggest this.

I admit that the hypothesis about the *miðfirðir* and Gardanes and Isafjord Churches is a very doubtful and controversial one. I can only express the hope that the difficult problems of the church topography of the Eastern Settlement will some day be solved. Future investigations of the Eastern Settlement (and especially of the "Middle Settlement") must aim to find out *wie es eigentlich gewesen*.

Since I wrote the above pages on the Middle Settlement there has been a new development. This summer (1989) my younger, but very experienced colleagues Jette Arneborg Petersen and S. E. Albrethsen carried out intensive investigations throughout the Middle Settlement. They found many hitherto undiscovered ruins (Eskimo as well as Norse remains); but they found *no* church. Yet this should not reflect on Jette Arneborg and S. E. Albrethsen: it simply shows *how* difficult it can be to find a Norse church in Greenland. But one day, I am sure, we shall find a church (perhaps two) in that region. We must keep trying!

Vagar Church, Ø 162

In some of the foregoing pages I have tried to locate Vagar Church (Fig. 18). On the basis of Ivar Bardarson's account and my own observations in the field, I have come to the conclusion that in spite of everything Vagar Church was the one I found in 1946 at the Norse

Fig. 18. Vagar (Ø 162). View from the SE. The church is situated near the centre of the picture, at the bend in the small river (photo, C. L. Vebæk, 1946).

farm Ø 162. I visited Narsaq in August 1946 during a reconnaissance trip to the southern part of the Eastern Settlement. Before this no one was aware that there were Norse ruins there. But at the lower end of a very distinctive bay, on a fairly large plain, lie the ruins of a fair-sized farm with a homefield stretching from the beach 140–150 metres inland. There is a distinctive, straight homefield dike about 65 metres long, with a north-south orientation. Some small rivers and brooks run through the valley, which is partly terraced with sandbanks, partly consists of rock and moor; but there are also grassy areas, especially in the homefield, where there had been at least five buildings. Two of these were relatively large, and one must have been the main farmhouse. Outside the homefield lay at least 8–10 buildings, but I regret that for various reasons we never carried out a closer, more satisfactory investigation of this farm (Fig. 19).

Yet we did find one thing of special interest. In the northeastern corner of the homefield, near the fence, just on the bank of a bend in one of the small rivers, we found a church. This came as rather a surprise, as we had not anticipated finding a church here. It is a small, completely ruined church that seems to have measured about 8 x 5 metres (outside measurements), perhaps a little more. It is surrounded by a churchyard fenced in by a circular dike 20–22 metres in diameter (outside measurements) (Fig. 20). The fence is very low, but the stones no doubt only served as a basis for a turf wall, now completely vanished. Inside the fence we did some sample excavations and found sure evidence of graves, including traces of a wooden coffin with iron nails. The skeletons were completely decomposed. Having found

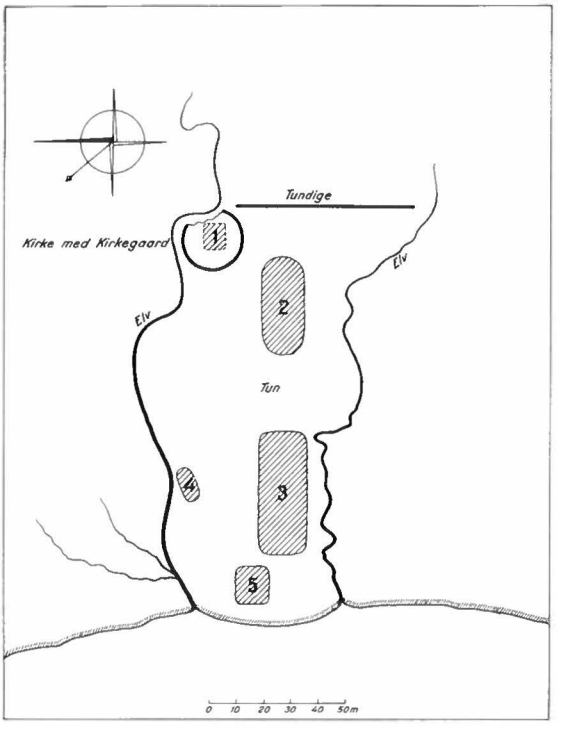


Fig. 19. Vagar (Ø 162). Sketch, C. L. Vebæk, 1946.

this church, we quite naturally wondered whether we could identify it with any of those in the written sources. I came to the conclusion, as I have argued above, that this was Vagar Church (Fig. 21).

Fig. 20. Vagar (Ø 162). The church and churchyard. The two men in the picture indicate the limits of the churchyard (photo, C. L. Vebæk, 1946).

Fig. 21. Map of the greater part of the Eastern Settlement. All known Norse churches (1989) are marked by crosses (and their site numbers). All other farms (without churches) are marked by dots (without numbers) (reproduced from K. Krogh, 1976).

Part II
The Excavations at Narsarsuaq in Uunartoq Fjord: The Benedictine Convent

1. Introduction and general remarks

In Part I of this paper I dealt with the church topography of the Eastern Settlement. One of my main intentions was to establish, if possible, the site of the Norse Benedictine convent. Without repeating all the arguments here, I will simply say that on the basis of studies of the written sources and observations in the field, I felt sure that the convent (known only from Ivar Bardarson's description of Greenland) was to be found at the Norse site discovered in 1932 by Poul Nørlund at Narsarsuaq (the Greenlandic word for "big plain") in Uunartoq Fjord. When he found the ruins here (Site No. Ø 149) Nørlund himself thought this was the Benedictine convent. I have said that the only written source for the convent and the Augustinian monastery in Tasermiut (the Norse Ketilsfjord) is Ivar Bardarson; but in fact the existence of monastic houses in Norse Greenland is documented by one other manuscript, a very short note in an ecclesiastical document of 1308 (Vebæk 1953: 199).

Part II of my paper will deal exclusively with the excavations the Danish National Museum implemented at Narsarsuaq in the summer months of 1945–46 and 1948. All the expeditions were led by the author, who assumes full responsibility for all that was done (and of course for all that was not done, but should have been done, as I have later realized); and for the regrettable mistakes I fear were made.

At all events I am now as far as possible publishing all the material documented by my notebooks, a number of ground plans and many photographs. Nearly all this work, and a great deal of the excavation work itself, especially of the graves, I did myself; this was unavoidable, as I was the only archaeologist in 1945 and 1948; but in 1946 Olfert Voss (later an assistant keeper at the National Museum) took part in the expedition and helped me greatly, especially in drawing up the General Plan of the site.

The excavation work – often arduous – and all the other work necessary on an expedition of this kind, was done by 10–20 young Greenlanders from the small settlements in the region, which still existed at the time. Several of them worked in all three years, and I thank them all for everything they contributed to the expedition. Last, but not least, I thank my dear wife Mâliâraq, who accompanied me on all three expeditions (as she did later on most of my expeditions to Greenland). She took care of all the housekeeping tasks, and worked as an interpreter, as (unlike myself, deplorably) she spoke both Greenlandic and Danish.

This is perhaps the proper place to admit that I was very much in need of expert help. In 1945, when the graves in the church and churchyard were excavated, an anthropologist could no doubt have made important observations I was unable to make. A geologist could have unravelled the entangled stratigraphical issues which presented me with such problems, and which I will discuss later in this paper. And of course another archaeologist each year would have been invaluable. It was all simply too much for one man; but at that time the teamwork we are familiar with today was not common. This is of course among other things a question of money, but I have no doubt that the results of the investigations at Narsarsuaq would have been more valuable if we had been a team of the type I have indicated above. I feel sure that if the work at Narsarsuaq is ever taken up again, as I hope it will, it will benefit from the expertise of a number of different specialists.

2. General description of the Narsarsuaq convent site and the Norse ruins found there

Uunartoq Fjord (see map, Part I, Fig. 13) is a region of unique beauty, surrounded by majestic mountains, with an atmosphere of mystery and the supernatural. The fjord is known to all present-day Greenlanders not only for the island of Uunartoq, with its hot springs, still used by the local population for curing their diseases, but also from *Uunartoq*, the beautiful and amusing poem about the fjord by Greenland's national poet Henrik Lund.

Sailing up the fjord, one passes Uunartoq Island, with its small (now uninhabited) settlement of Ipik. A little farther up on the north side is the peninsula of Inuaq, running approximately north-south (Fig. 22). Once past the peninsula, on the eastern side of which the fjord widens greatly to the north, one comes to a large bay. Just to the east of Inuaq, a little way up the bay, a large plain slopes gently eastward to the fjord. The plain is marked off from Inuaq by a small, curving river. Between three and four hundred metres north of this river along the coast, and with a similar east-west extension, we have the plain, which is rich in grass, but practically devoid of any other vegetation (*e.g.* willow) because of the strong ESE winds (the Greenlandic *niqeq*) that often blow here (Fig. 23). The Greenlanders call the plain Narsarsuaq "the big plain" – a comparatively common place-name in Greenland (used for example of the large airfield of Narsarsuaq in Tunulliarfik Fjord, north east of Qaqortoq).

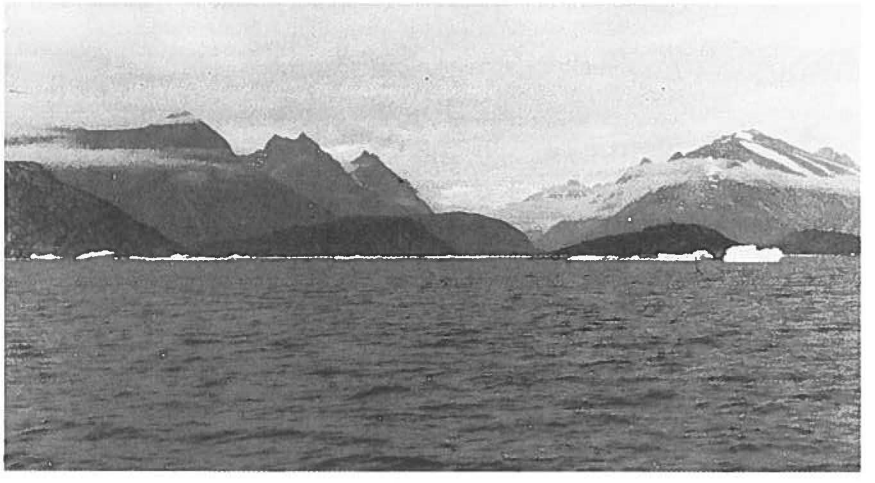


Fig. 22. The outer part of Uunartoq Fjord, seen from the west. Behind the low mountain in the picture – the peninsula of Inuaq – lies the Benedictine convent (photo, C. L. Vebæk, 1946).

The Narsarsuaq in Uunartoq Fjord is very suitable for the kind of farming (cattle, sheep, goats, horses and even pigs) familiar to the Norsemen from their places of origin. Here too we find the ruins of a comparatively big farm, and a church surrounded by a churchyard. As shown in the General Plan (Fig. 24) of all the ruins found during our excavations, we registered a total of 21 ruins of various kinds, mostly inside the low, but quite distinct fence surrounding the homefield. With a few interruptions the fence can be followed from the river in the south, running westward at first for about 130 metres, then bending quite sharply and following an almost straight line for about 400 metres right down to the coast. The homefield has a rich grass covering and stands out clearly from the surrounding areas.

The 21 ruins counted were all described, and some were excavated exhaustively. But it must be said at once that there may very well be ruins we did not notice,

Fig. 23. General view of Narsarsuaq, with the convent, from the south (photo, C. L. Vebæk, 1945).

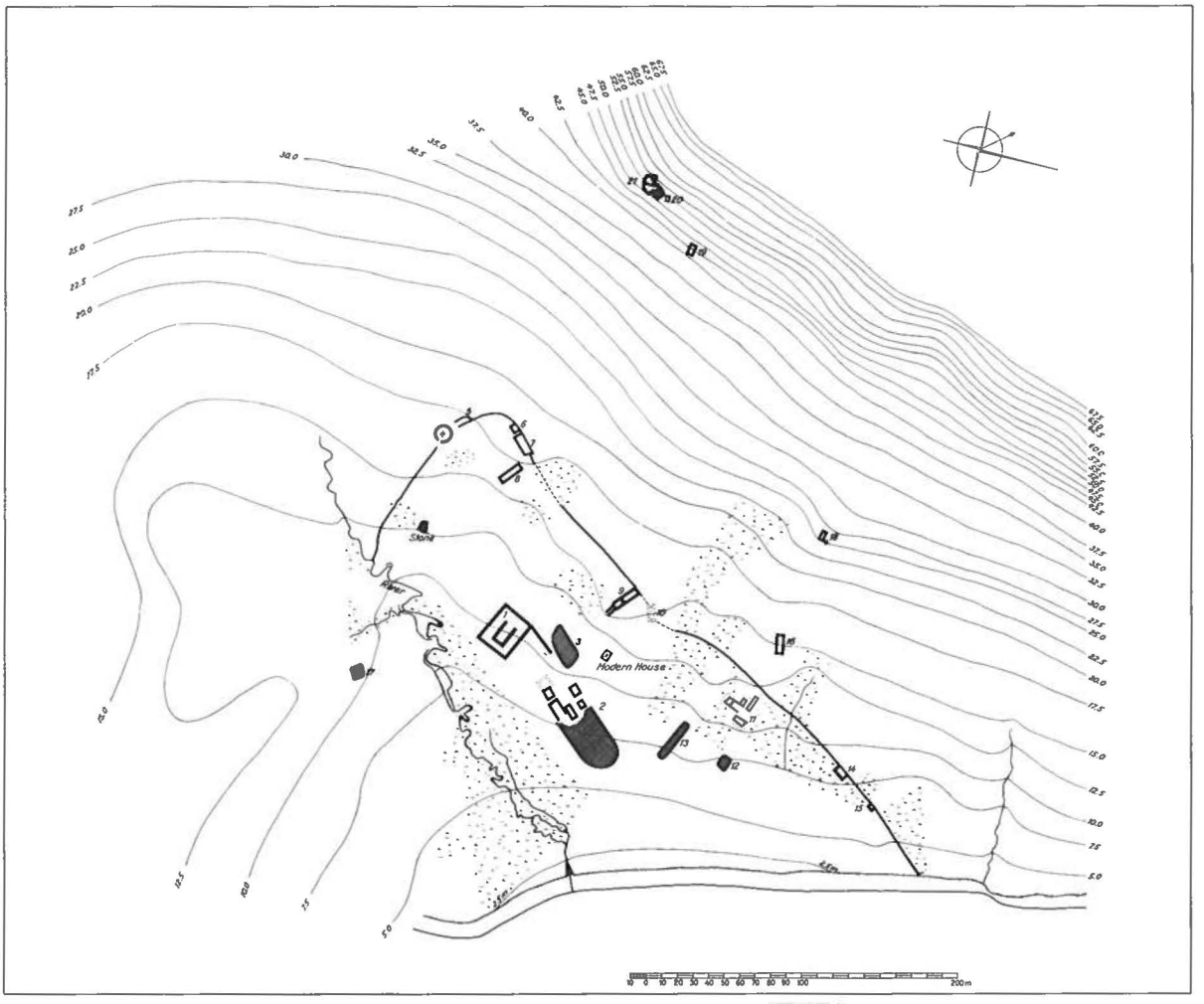


Fig. 24. Ø 149, Narsarsuaq (the convent), General Plan (O. Voss and C.L. Vebæk, 1946).

even inside the homefield, as nearly all the remains were very indistinct, in many cases only visible as irregular heaps of stones, and often completely covered by turf. The poor condition of the Norse ruins on the plain of Narsarsuaq is undoubtedly attributable to the same phenomenon as influenced the vegetation so much: the strong local *niqeq* winds, often taking the form of violent storms of many days' duration. No building has a chance of standing for centuries in such circumstances, even if built with the so-called dry-masonry technique; and certainly not if built, as most of the houses at Narsarsuaq were, with a combination of stones and turf.

I admit that our first impression of the Norse ruins at Narsarsuaq was that this was a hopeless place even for a moderately successful archaeological investigation. Our three expeditions to Narsarsuaq showed that it was even worse than expected, and we had to overcome many difficulties.

However – to begin at the beginning, in August 1945 – I felt sure that this was the convent mentioned by Ivar Bardarson, so we summoned up all our optimism and simply got started. We decided to begin with the ruin presumed to be the church and churchyard. Most of the summer of 1945 was spent on these (Fig. 25).

3a. The church

To begin with, the church, like most of the other ruins at the site, looked rather hopeless (Figs. 26, 28 & 24 no. 1). It appeared as a heap of stones, and more stones were scattered over an area of about 80–100 square metres. Only in one place could we distinguish part of the wall of a building. Of the churchyard fence nothing was visible. We began digging and removing what we were sure were loose, fallen stones, and we soon made some archaeological finds. In the stone heap we found and excavated *three Eskimo graves*(Fig. 27) (and I now regret that we did not draw these graves).

Fig. 25. A view from the mountains approximately west of Narsarsuaq. Just to the right of the tents are the church and the churchyard. The building to the left of the tents is a shepherd's house (not finished) (photo, C. L. Vebæk, 1946).

Eskimo Grave 1 was built in the usual way, with flat stones, and had inside dimensions of about 1.25 × 0.40 metres; it was 0.3–0.4 metres deep. In this grave we found a few fragments of skeletons (but no skull). There were no grave goods.

Eskimo Grave 2 was much like Grave 1. Its length and width were 1.3 and 0.5 metres, and it was 0.3–0.4 metres deep. In this grave there were fragments of a broken skull and some other skeleton parts, but likewise no grave goods.

The same was true of Eskimo Grave 3, but this grave was completely destroyed, although a few parts of skeletons remained.

Before continuing with the description of the excavation of the church I should perhaps mention here the rather surprising fact that apart from the three Eskimo graves no evidence of Eskimo activity was observed at the site (but see below). At a great many of the Norse farms along the coast, especially in the outer fjords, there are traces of later Eskimo habitation, often the bare fact that Eskimos have built their houses directly on top of the Norse buildings. In some cases it seems that the Eskimos simply took over the Norse houses shortly after the Norsemen had left them, changed the buildings just enough to suit their own needs. Sometimes the Eskimos have built their houses directly beside the Norse houses. In all cases they used materials from the Norse buildings. In a very few cases, too, we have found traces of very old pre-Norse Eskimo settlement under the Norse layers – for example under the *landnáma* farm Ø 17a, Narsaq, where we found traces of the Saqqaq culture. But at Narsarsuaq itself we found nothing suggestive of Eskimo settlement except a few glass beads (and possibly some other things).

Returning to the church and churchyard, in spite of all the difficulties and the poor condition of the ruins, I

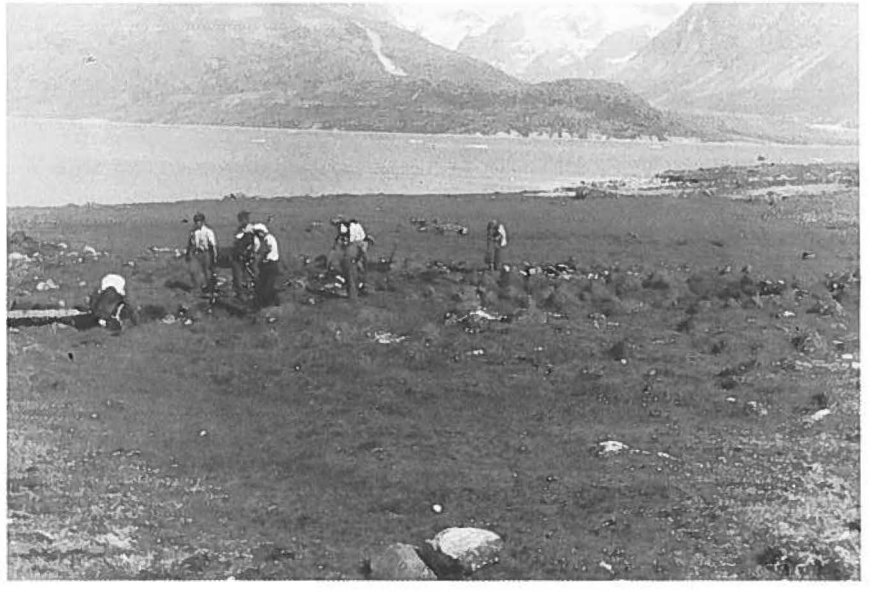


Fig. 26. The church at the beginning of the excavation, seen from the west (photo, C. L. Vebæk, 1945).

Fig. 27. One of the Eskimo graves built in the church ruin (photo, C. L. Vebæk, 1945).

believe we succeeded in arriving at a reliable plan of the church, inside and outside, and of the churchyard and its fence. First I will describe the church, referring to the plan of the church and the churchyard done on-site (scale 1:100) and a selection of photographs (Fig. 29–34).

The convent church was a simple, rectangular building constructed of stones, at least in the lower courses. But towards the west the wall must have been made of wood, a feature familiar from at least seven other Norse churches in Greenland (Krogh 1976: 300–301).

The church is not quite EW-orientated, like most Norse churches– rather ESE-WNW; but for practical reasons I shall permit myself to speak of EW and NS. There was no trace of a door in the stone walls; access to the church must have been through the wooden wall at the western end. The inside dimensions of the church were about 12.8 × 5.0 metres, and the outside measured about 15 × 9 metres (Fig. 30). The stone walls (at least at the base) were made up of very large blocks, and smaller stones were mainly used higher up. The walls as they are now only rise to a height of 0.4–1.0 metres. They seem to have been about one metre thick, but the very dilapidated condition of the whole church makes it difficult to say anything absolutely certain about this. The closest parallel to the ground plan of the convent church among other known Norse churches in Greenland is that of Undir Høfdi, which is however slightly narrower and somewhat longer (Krogh 1976: 300).

The stone walls of the church require some further description. While they had collapsed, and some of the foundation stones were not in their original position, I am nevertheless fairly sure of the construction of the walls. In most of them, one or two courses actually remained, and at one point there were three, rising up to one metre above the ground surface. Inserted everywhere in the interstices between the large stones were small, flat, fitted stones (Fig. 31). There were no traces of mortar, but grey, sandy clay or turf of the same nature appears to have been used as sealing material. The foundation stones were placed directly on the ground surface or only slightly embedded in the ground (0.1–0.2 metres deep). It should however be noted, as a fact of considerable importance, that the foundation stones had been laid at some points on a deposit of culture soil containing charcoal, especially at the north wall, where in some cases we found up to 0.30–0.35 metres of disturbed soil under the foundation stones, which just here seemed to have retained their original position. Moreover it must be noted that in some places under the walls of the church we found fragments of skeletons up to 0.25 metres under the walls. The only possible interpretation of these observations seems to be that there had been an older churchyard at the site than the one around the existing church; and that there must have been another, older church (of which we have no trace, however) on or near the site. This may have been a church – most probably a small one – entirely built of wood and turf, and may date far back in the history of settlement here. Other features to be discussed later suggest that there was more than one period of Norse settlement at Narsarsuaq: at least two periods can be proven. I believe that the first Norseman to settle here was one of the *landnámamenn*. As indicated above, the place would be most inviting from a Norseman's point of view – probably the best place in the whole region. It was surely inhabited at an early stage of the colonization of Greenland, and the first church here must have been erected not many years after the coming of the first settlers. However, at some point the farm seems to have been destroyed, or at least abandoned. We do not know when or how, but the matter will be discussed below.

Later the place was resettled, and I believe that this was when the Benedictine convent and a church (not necessarily the extant one we excavated) were established. It may be that all the other extant ruins at Narsarsuaq are from the same time.

One feature of the church remains to be described: the floor. It seems to have consisted wholly of gravel: there were no traces of a covering of flags, or of any wooden floor (which would of course have been surprising). The whole floor of the church was very carefully examined. At the eastern end we found a strange, flat, rectangular depression of about 3 × 4 metres, and about 0.2–0.3 metres deep. Between this depression (which was not natural, but the result of digging) and the walls there was only a narrow border. The western part of the depression had the character of an actual pit, reaching a depth of about 0.4 metres. In this pit there were a lot of

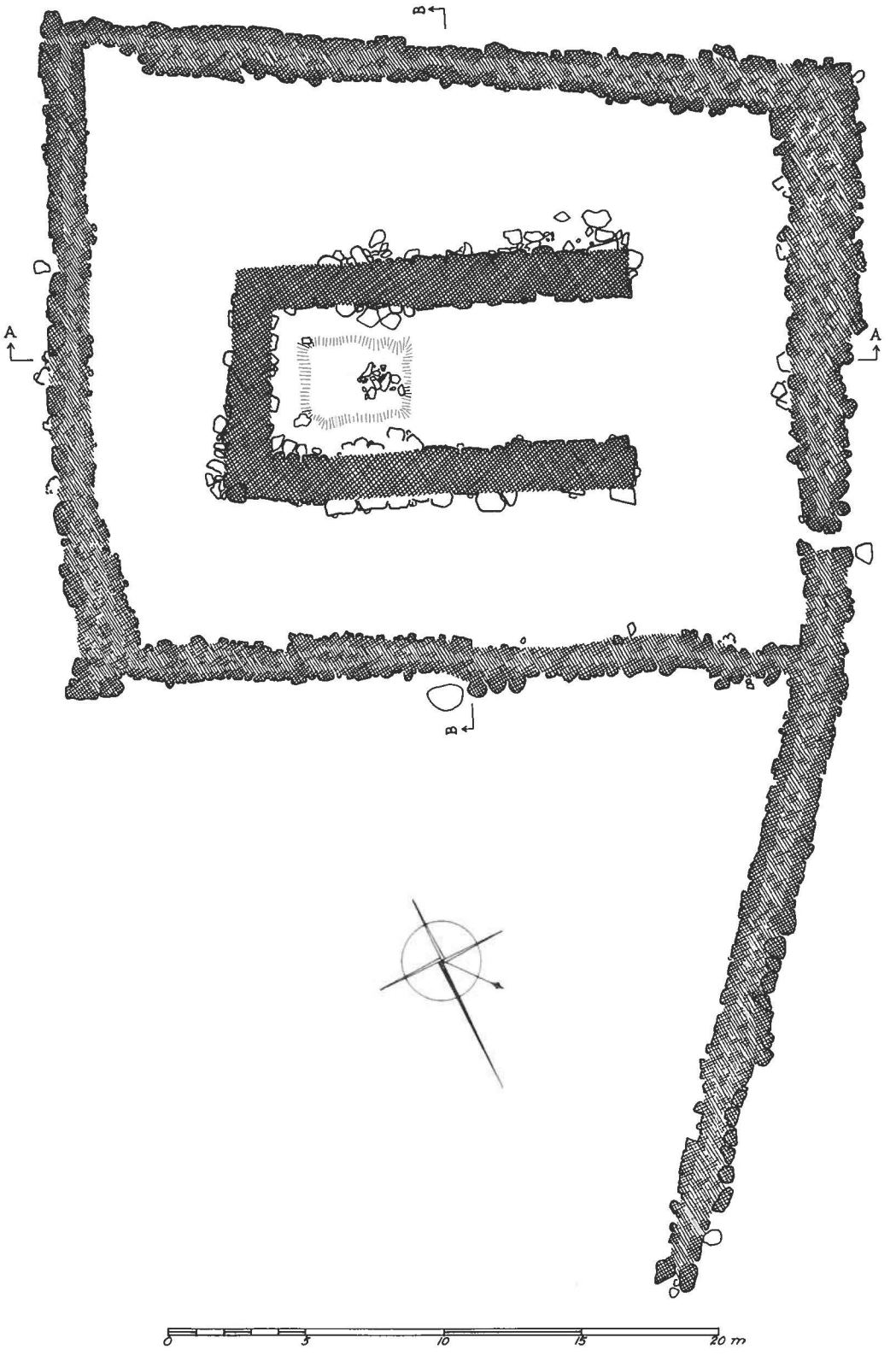


Fig. 28. Plan of the church and the churchyard (C.L. Vebæk, 1945).

Fig. 29. From the excavation of the church, at an early stage (photo, C. L. Vebæk, 1945).

variously-sized stones, and everywhere among the stones we found traces of fire in the form of a thin, black covering. There can be no doubt whatsoever that this was a fireplace (Fig. 32) (*cf.* Nørlund & Steenberger 1934: 31).

Before leaving the church, a few words must be said about the date of the church building. As already pointed out by Aage Roussell (1941), and later confirmed by Knud K. Krogh (1976), the Norse-Greenlandic churches of precisely this rectangular type (whether the west gable was made of wood or stone) seem to have been built around 1300. But since the Benedictine convents known from Iceland and Norway seem to have been established in the twelfth century, and there is nothing to indicate that the only Benedictine convent known from Greenland was much later (if it was later at all), there must have been an earlier church here than the extant one. Theoretically, there may have been at least two older churches: one built concurrently with the establishment of the convent, and one still older, which

Fig. 30. The church at a later stage of the excavation (before excavation of the graves inside and outside the church), seen appr. from the ESE (photo, C. L. Vebæk, 1945).

Fig. 31. One of the best-preserved parts of the church, the inner side of the SW wall, seen from the NNE (photo, C. L. Vebæk, 1945).

may (in my opinion) date back as far as the *landnáma* period. That there was at least one older church has been directly proven by observations of the stratification under the church walls. It is my personal hope that future investigations at Narsarsuaq will shed new light on this interesting and important question.

3b. The graves in the church

Most of the floor area, from the western end and 6.4–6.5 metres in towards the east, was filled with graves – twenty in all (or more precisely, a total of twenty persons had been buried there). The graves were so numerous and so close to one another that there would have been room for only three or four more before the church was completely filled with graves. The graves stood out clearly as dug out areas in the

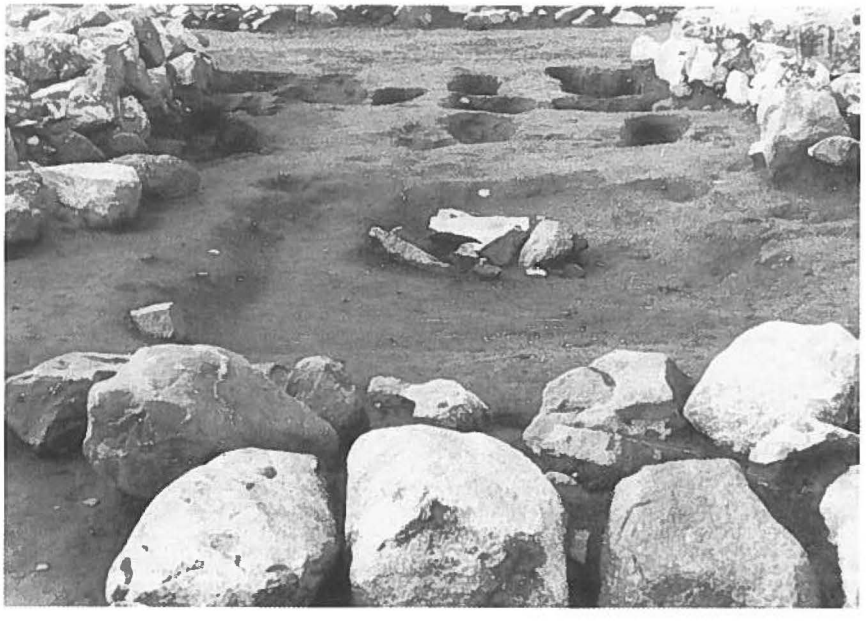
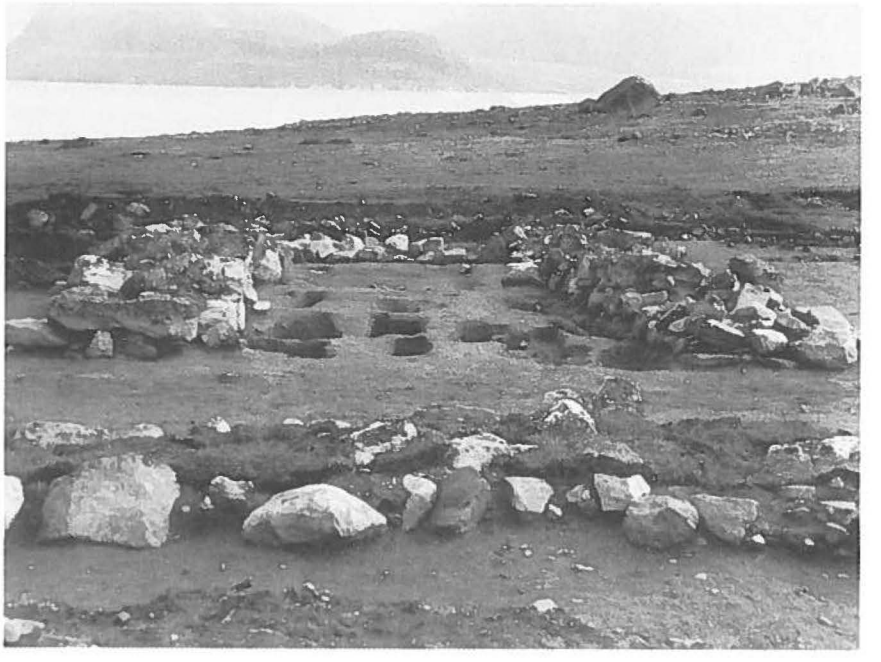


Fig. 32. The interior of the church, appr. from the east. In the foreground the depression with the fireplace, in the background the excavated graves, seen appr. from the east (photo, C. L. Vebæk, 1945).

Fig. 33. The church and its graves, appr. from the west (photo, C. L. Vebæk, 1945).



gravel (Figs. 33 & 34). As will be evident from the ground plan (Fig. 35), there were ten graves (a-k), five of which contained only one person, while the others contained between two and four persons. The individuals buried were numbered 1–20. Some of the graves were so close to one another that they had, as it were, merged; but the graves had been dug in such a manner that, with few exceptions (Graves h and k), no earlier graves had been directly disturbed. The only possible explanation of this seems to be that the position of the earlier graves was known with absolute certainty. They must have been marked in some way, but no traces of this could now be observed.

The state of preservation of the skeletons in the graves in the church was very poor. At least, we were unable to take back any parts of the skeletons for anthropological investigation. In reality, all that was left of the skeletons was dust; but in some cases we were able

Fig. 34. The graves in the church, excavated, appr. from the SE (photo,C. L. Vebæk, 1945).

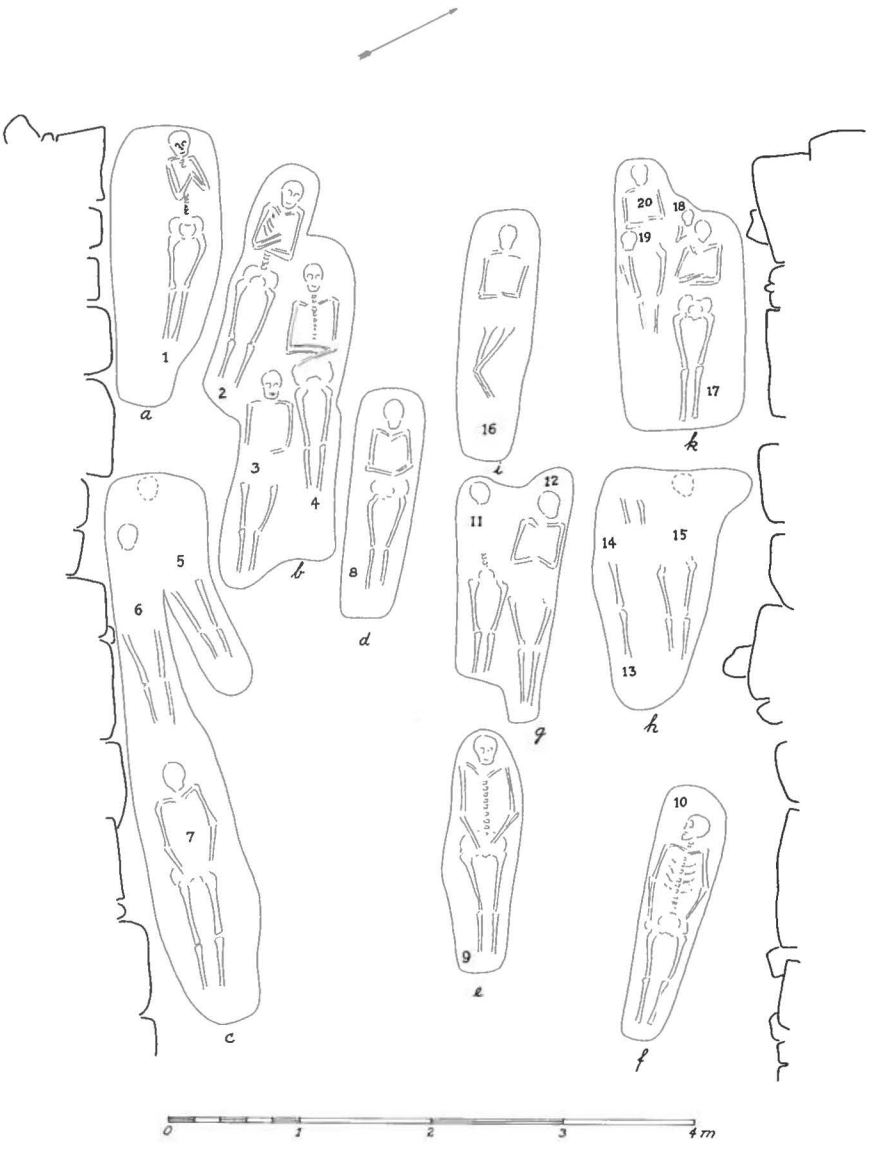


Fig. 35. Plan of the graves in the church, seen appr. from the SE (C.L. Vebæk, 1945).

to take photographs, and in most graves it was possible to make drawings of the skeletons, or at least parts of them.

In general, all the graves in the church had the usual approximate EW orientation, and the individuals buried had been placed in their graves with their heads pointing west. The bodies were stretched out (with one exception – Skeleton 16, which was lying with slightly bent legs). Nearly all the occupants of the graves had their arms crossed across their breasts, but in some cases the arms were stretched along the bodies or slightly folded.

The following descriptions can be given of the individual graves.

Grave *a*, with Skeleton 1: slightly over two metres long, up to 0.9 metres wide, 0.15–0.25 metres deep. The skeleton was comparatively distinct.

Grave *b*, with Skeletons 2–4: the maximum length of this grave was a little over three metres, and it measured up to one metre across. The grave was 0.15–0.35 metres deep. Skeletons 2 and 4, both lying rather superficially, had quite distinct contours, while Skeleton 3 was much obliterated.

Grave *c*: This grave really consisted of three burials, two of which formed a continuous whole lengthwise. This part of the grave had a total length of about four metres, containing Skeletons 6 and 7, while Skeleton 5 was in a depression at a slightly oblique angle to the

Fig. 36. Grave d, with Skeleton No. 8 (photo, C. L. Vebæk, 1945).

largest part of the grave, its part of the total grave being only 1.4 metres long. The burials in Grave *c* were at a depth of 0.3–0.6 metres.

Grave *d*, with Skeleton 8, measured about 1.8 × 0.6 metres and was 0.6 metres deep. The skeleton was distinct but greatly decomposed (Fig. 36).

Grave *e*, with Skeleton 9: about 1.8 × 0.4–0.6 metres, and 0.25–0.30 metres deep. The skeleton was distinct but completely decomposed (Fig. 37).

Grave *f*, with Skeleton 10: about 2.0 × 0.4–0.5 metres, and 0.4–0.5 metres deep. The skeleton was comparatively distinct, but, like all the others in the church, had turned to dust (Fig. 38).

Grave *g*: 1.6–2.0 metres long, 0.7–0.8 metres across, 0.6–0.7 metres deep. In this grave lay Skeletons 11 and 12, both completely decomposed (Fig. 39).

Grave *h*: about two metres long, up to about one metre wide and 0.6–0.7 metres deep. In this grave were two decomposed skeletons, 13 and 15, and traces of a third skeleton, No. 14, at a slightly higher level.

Grave *i*: about 2.0 × 0.6 metres, 0.6–0.7 metres deep, with Skeleton 16, much decomposed, yet distinct. This is the only grave in the church where the occupant lay with slightly bent legs.

Grave *k*: this grave was situated in the NE corner of the church. Its dimensions were about 2 × 1 metres (I regret to say that the depth was not written down in my notebook – but presumably it did not differ from that of the other graves). In this grave there were four greatly decomposed skeletons, Nos. 17, 18, 19 and 20, among which No. 18 must have been that of a child.

Burial inside the church is (to my knowledge) normally the privilege of the more important members of a community – that is, in this case those connected with the church, and in particular the abbots and nuns. But that it was not exclusively the clergy and nuns who found their last resting place here is proven by the finding of the skeleton of a child (No. 18). Besides its special function as a church for the Benedictine order, the convent church was undoubtedly also a parish church. So farmers and their families from the parish would be buried here; most of them in the churchyard, but – as we have seen – some in the church itself too.

Fig. 37. Grave e, with Skeleton No. 9 (photo, C. L. Vebæk, 1945).

Fig. 38. Grave f, with Skeleton No. 10 (photo, C. L. Vebæk, 1945).

Fig. 39. Grave g, with Skeletons No. 11–12 (photo, C. L. Vebæk, 1945).

4. The churchyard

The church had been surrounded by a churchyard fenced in with a rectangular wall built of stones. Nothing of the wall itself was visible at the beginning of the excavation, but it could be traced with certainty all the way round. Yet it must be said that the western part of the wall had collapsed so much that the foundation stones, as they have been drawn, are not all in their original positions. The inside measurements of the churchyard are about 20 × 25 metres. Outside, the fence wall measures 23–25 × 28–30 metres. The church is almost at the centre of the churchyard. The fence was constructed with stones in 1–3 courses, rising to a height of 0.35–0.50 metres, and there is no reason to believe that it was originally much higher (Fig. 40). However, it should be noted that on the eastern side, where the ground inclines towards the little river, we found that the wall rose to a height of 0.7–0.8 metres. There must of course have been a gate in the wall, but we were unable to find certain traces of one. Some of our observations, however, suggested that there had been a gate in the western wall, near the NE corner of the churchyard.

Before continuing with the description of the churchyard and the examination of the graves, this is perhaps the place – after the description of the wall and fencing of the churchyard – to mention that the west (NW) wall continues towards the north (NE), in the direction of the large complex of buildings shown as No. 2 in the General Plan, which has fencing of the same type and size as that around the churchyard. This wall (drawn on the plan of the church and churchyard) has a length of about 23 metres, and stops abruptly. The area east of this wall, between the churchyard and Ruin Complex 2, has no ruins of any kind. It may have been kept as an open, grassy field (perhaps cultivated as a sort of garden?).

Fig. 40. The southern part of the churchyard, and the southern part of the fence surrounding the churchyard (photo, C. L. Vebæk, 1945).

5. The graves in the churchyard

In the churchyard we carried out intensive investigations, but I regret very much to say that our excavations here were not quite as systematic as they should have been. Anthropological expertise was sadly lacking. However, despite everything, a not inconsiderable amount of skeletal material was brought to light, and many interesting observations were made. In all parts of the churchyard where excavations were undertaken, we found burials, in nearly all cases with more or less decomposed skeletons, although the material here was for some reason much better preserved than in the graves inside the church. As in the church, we found not the slightest trace of wooden coffins – neither wood nor iron nails. In fact it appears that the Norsemen here did

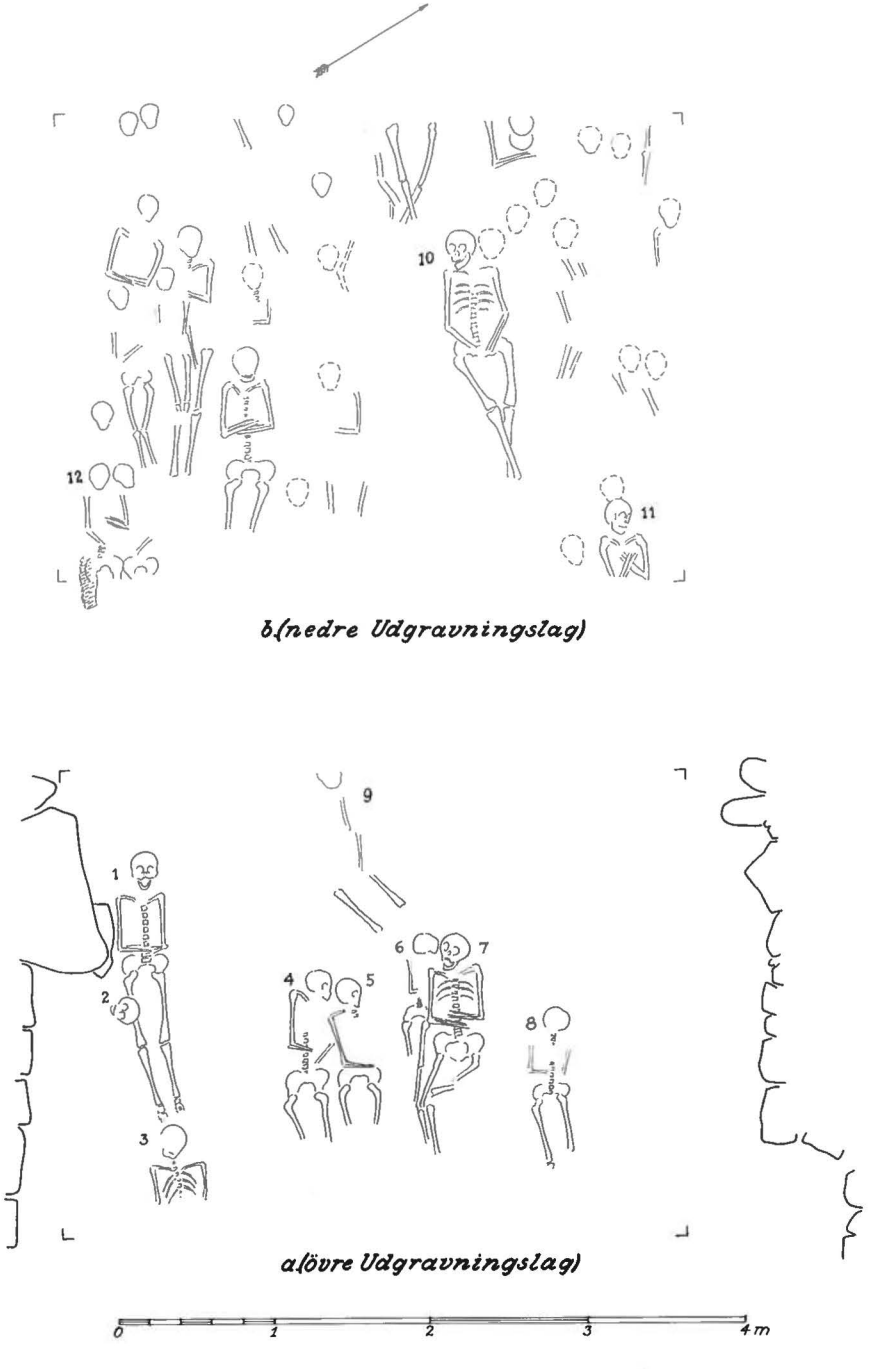


Fig. 41. Plan of Grave Field Ia (upper layer) and Ib (lower layer) (C.L. Vebæk, 1945).

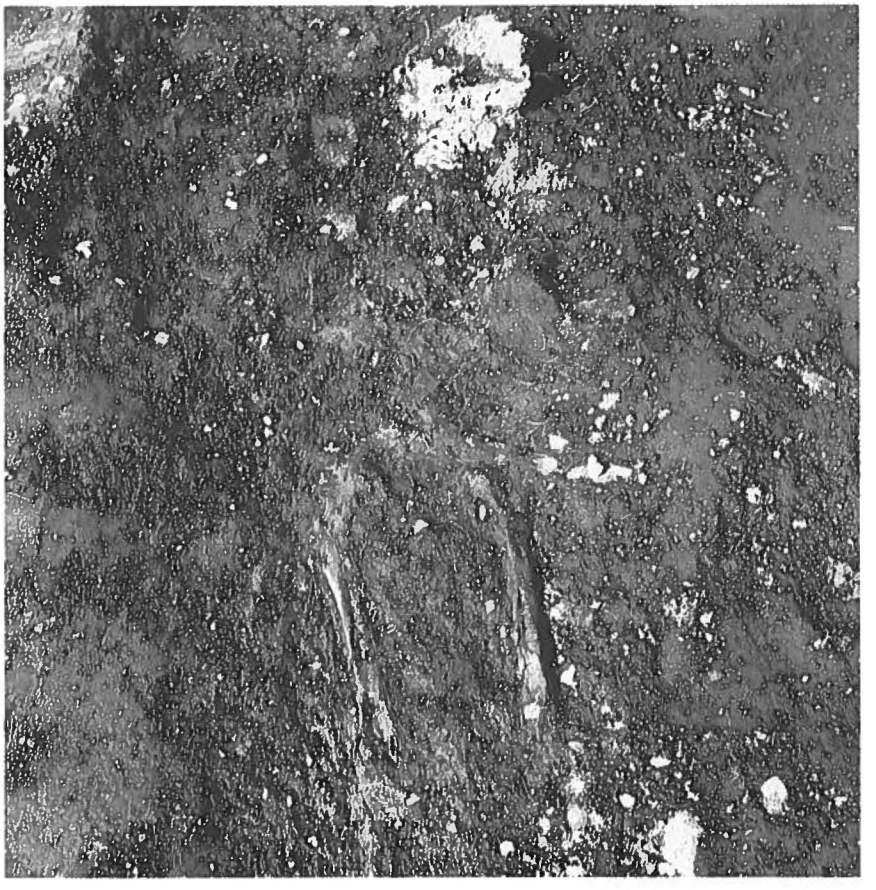


Fig. 42. (Presumably) Grave 1 in the churchyard (photo, C. L. Vebæk, 1945).

not use coffins at all. The position of several of the skeletons in relation to others simply left no room for wooden coffins. The bodies must have been buried wrapped in their clothes, or perhaps in a special shroud. Incidentally, few fragments of garments were found, all of them small and made of woollen cloth. One thing which suggests that wooden coffins were not used was the shape of graves inside the church: they all had rounded corners. If coffins had been used one would expect the graves to be rectangular.

As mentioned above, the excavation of the graves in the churchyard was regrettably not quite satisfactory – as regards the numbering (registration) of the graves, for one thing. While the skeletons inside the church were numbered 1–20, other numbers were used for the burials in the churchyard. The graves found first in the churchyard were numbered Grave 1 and Grave 2. Besides this, two larger excavation fields, I and II, had been marked off north and south of the church respectively. Within each of these the skeletons were numbered 1–12 and 1–11. A separate drawing (scale 1:20) was done of Field I, a-b, with an upper layer (a), and a lower (b); but it must be noted that there are not two stratigraphically separate layers (Fig. 41). The position of the skeletons to some extent precluded this. Excavation Field I measured 4 × 3 metres.

Referring to the plan, Grave Field II was situated in the SE part of the churchyard. There is a small sketch of this field (not published here), showing six skeletons (Nos. 1–6) lying in a row; east of these is another row of four skeletons (Nos. 8–11). Between these two rows there was a single skeleton, No. 7. I greatly regret that there appears to be no separate drawing of Field II like the one of Field I. We took a number of photographs of all the graves and skeletons. Some of them are reproduced here.

The following description can be given of each grave and skeleton.

Grave 1 (in the NE corner of the churchyard) had been dug down only a few centimetres. It contained traces of a single adult, and quite close to this were parts of the skeleton of a child. (Fig. 42).

Grave 2: at the east end of the church we found a complete, but greatly decomposed skeleton, lying, like most of the skeletons in the churchyard, on its back, stretched out EW with the head to the west. This skeleton was measured and drawn. The individual seems to have been about 1.48 metres tall (Fig. 43).

Fig. 43. (Undoubtedly) Grave 2 in the churchyard (photo, C. L. Vebæk, 1945).

Returning to Grave Field I, here excavation revealed many more or less whole skeleton finds and fragments of others, down to a depth of 0.8 metres. Twelve of the skeletons were so distinct that they could be registered and drawn (Nos. 1–12). The following skeleton material was in good enough condition to be removed for anthropological examination.

Skeleton 1: the lower extremities, some thoracic vertebrae, parts of the arms, and fragments of the skull and the lower jaw.

Skeleton 2: only the skull (very defective) (Fig. 44).

Skeleton 3: a few cervical vertebrae, fragments of both jaws and the skull.

Skeleton 4: the lower jaw (defective), part of the upper jaw, some cervical vertebrae, fragments of the skull and loose teeth.

Skeleton 5: fragments of the skull, a fragment of the lower jaw with teeth, besides loose teeth and the top vertebra.

Skeleton 6: part of the skull, the lower jaw with teeth, loose teeth and the two uppermost vertebrae (Figs. 45 & 46).

Skeleton 7: a well-preserved skull, the lower jaw, several vertebrae.

Skeletons 8 and 9: nothing (Fig. 47).

Skeleton 10: the skull and cervical vertebrae, parts of the lower jaw. This skeleton stood out very clearly. It was the only one lying with its legs slightly bent (Figs. 48, 49 & 50).

Skeleton 11: all the vertebrae and a fragment of the lower jaw (Fig. 51).

Skeleton 12: nothing of the skeleton, but fragments of garments.

Fig. 44. Grave Field Ia (upper), Skeletons 1 and 2 (photo, C. L. Vebæk, 1945).

Fig. 45. Grave Field Ia (upper), group of skeletons (Nos. 4, 5, 6 and 7) seen appr. from the east (photo, C. L. Vebæk, 1945).

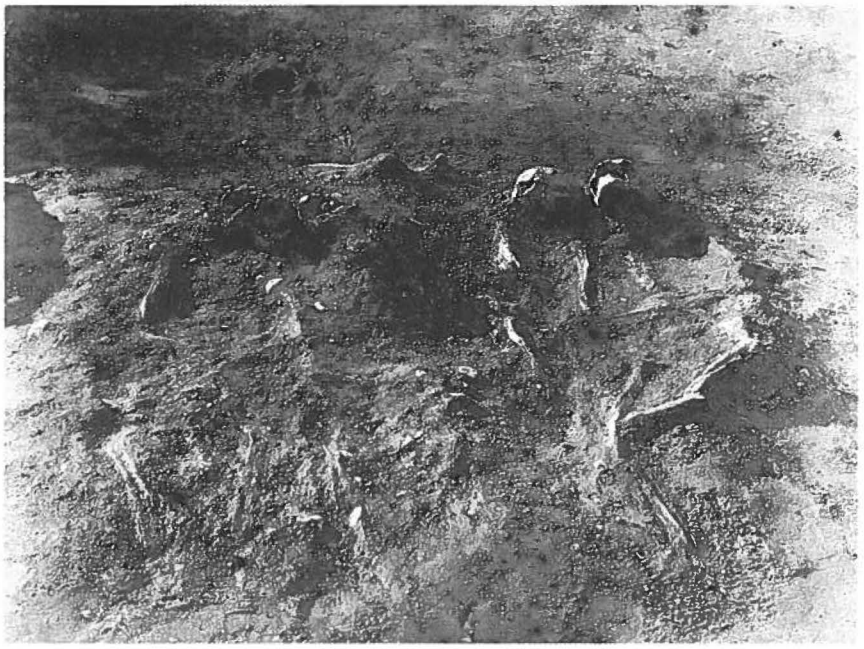


Fig. 46. Grave Field Ia (upper), group of skeletons (Nos. 4, 5, 6 and 7) seen appr. from the SSE (photo, C. L. Vebæk, 1945).

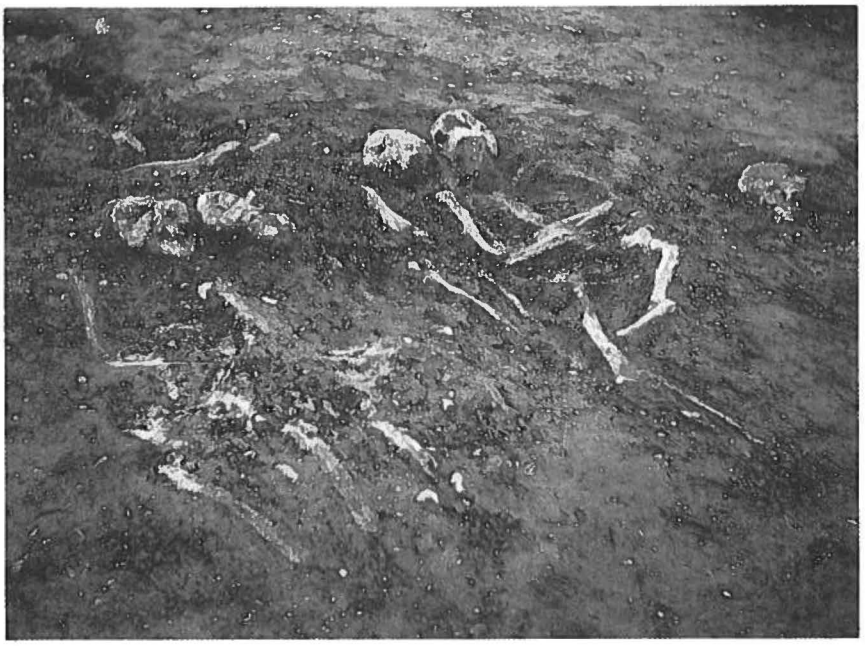


Fig. 47. Grave Field Ia (upper), group of skeletons (Nos. 4, 5, 6, 7 and 8) seen from the north (photo, C. L. Vebæk, 1945).

Fig. 48. Grave Field Ib (lower), during excavation, seen from the SSE (photo, C. L. Vebæk, 1945).

Fig. 49. Grave Field Ib (lower), Skeleton 10 (photo, C. L. Vebæk, 1945).

Fig. 51. Grave Field Ib (lower), Skeleton 11. The skull and the upper part of the body (photo, C. L. Vebæk, 1945).

Fig. 50. Grave Field Ib (lower), Skeleton 10, close-up of the skull and the upper part of the body (photo, C. L. Vebæk, 1945).

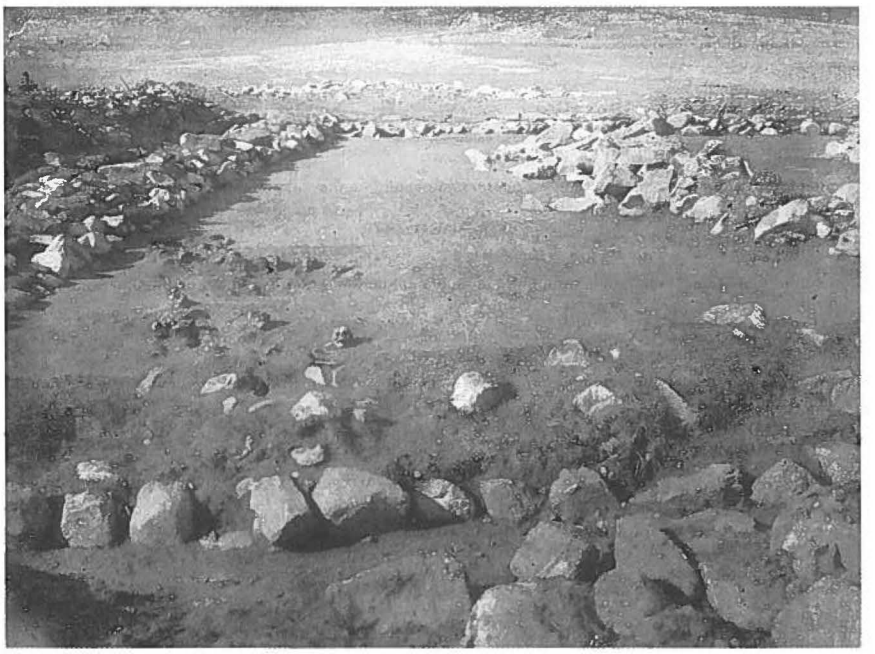


Fig. 52. Grave Field II, seen from the east (photo, C. L. Vebæk, 1945).

It must be noted that Grave Field I was not completely excavated (owing to the shortage of time), and of course I regret this very much. As will be seen from the ground plans and photographs, some of the skeletons – apparently of both young and older individuals – in Field I were lying so close that one might consider the burials a mass grave, perhaps an indication of mass deaths caused by epidemics, a theory I have proposed in an earlier paper (Vebæk 1953: 198). I look forward to the opinions of the anthropologists on this.

Fig. 53. Grave Field II, seen from the ENE (photo, C. L. Vebæk, 1945).

Grave Field II was – as I have said – at the south side of the church. It measured about 4.5 × 9 metres. Only the upper layer was actually examined here, and the graves excavated were near the surface (Figs. 52 & 53). Nearly all the skeletons here were greatly decomposed (more so for some reason than at the opposite side of the church), and it appears from the information in my notebook that only eleven skulls were removed and taken to the Anthropological Institute for closer study. (Figs. 54 & 55). Of Skeleton 10 there remains the skull, with a fragment of the upper jaw of a different individual. Of Skeleton 11 there remains the skull, with a tooth from another individual (Fig. 56).

When uncovering one of the skeletons in Field II (Skeleton No. 7) we made a very interesting – in fact a unique – find. Under the left arm, along the body, we found a row, 0.325 metres long, of quite small, flat, ring-shaped links (mostly iron, a few made of bronze). The only possible interpretation of this find (which will be described and discussed in more detail later in the paper, in the chapter dealing with the objects found) seems to be that there was a slit in the individual's mantle, on each side of which a number of these ring-shaped links had been fastened. They were very closely spaced, and a woollen or leather cord could have been drawn through them to close or open the garment. We might perhaps call it a kind of "zip" (Fig. 57). Apart for this odd item of clothing (and some fragments of woollen garments) nothing at all was found in any grave, either in the church or in the churchyard; nor had anything been expected.

Besides the graves described above, remains of graves – fragments of skeletons, generally poorly pre-

Fig. 54. Grave Field II, Skeletons 1–6 (photo, C. L. Vebæk, 1945).

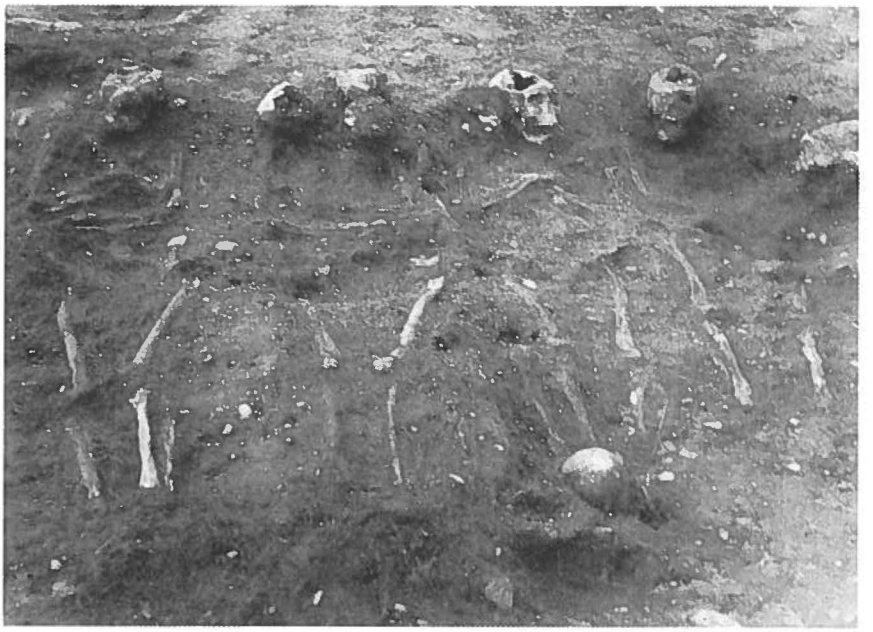


Fig. 55. Grave Field II, Skeletons 4 and 5 (photo, C. L. Vebæk, 1945).

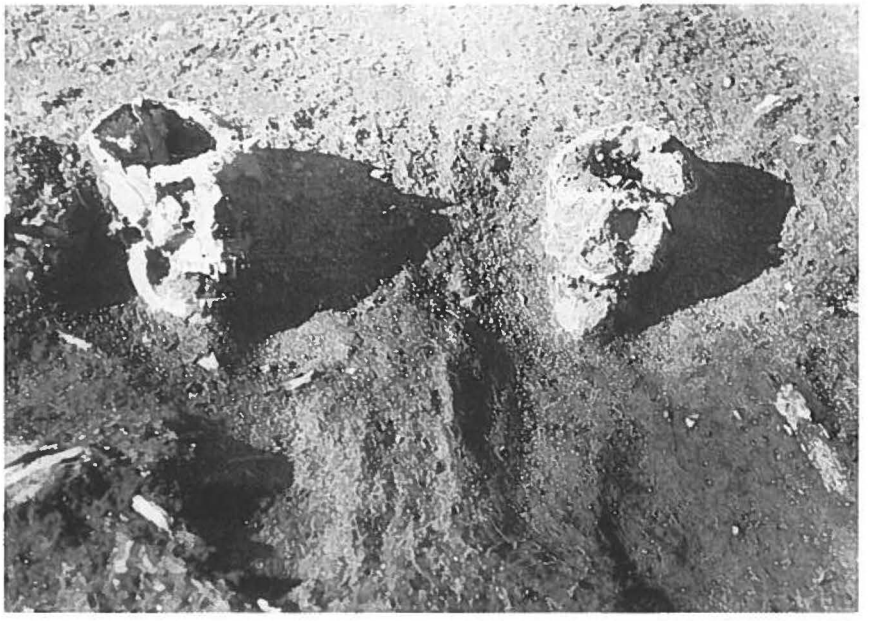


Fig. 56. Grave Field II, part of Skeleton 11 (photo, C. L. Vebæk, 1945).

served – were found in all parts of the churchyard. There were at least seventeen skeletons of this type. We also found heaps of human bones from older, demolished graves. Very near the SE corner of the churchyard we found, at a considerable depth (I regret that I do not have the exact figures), just such a heap of bones, apparently all from the same individual (the skeleton parts included the skull, thighbones etc.). Another heap of bones (Heap No. 2) contained fragments of the skulls and teeth of at least two individuals. Some of the best-preserved bones were found in a heap in an odd place: on top of the churchyard fence, on the north side, near the eastern corner (I regret that in my notebook I have no accurate list of the skeleton material found here and removed, but it must have been from several individuals) (Fig. 58).

To conclude this section on the graves in the churchyard, given the large number of graves found we can only surmise that the churchyard had been in use for a long time, perhaps for several centuries – from before the extant church was built (c. 1300) until the day Norse habitation here came to an end. We are unable to say anything about when – and how – it ended. It may be presumed that it was rather late in the history of the Eastern Settlement, but we can prove nothing at present. We found no objects that can be accurately dated, and so far we have no radiocarbon datings from the later period. Yet this problem must be solved one day (*e.g.* section 10 below).

As earlier mentioned I considered the positioning of some of the skeletons in Grave Field I as an indication of mass burial. The skeletons lay very close to one another, and I have cautiously proposed the theory that this might indicate death from epidemics where many people died at the same time.

It is likely that the interments represent a mass grave, as observed in the archaeological records. However, this could neither be proved nor disproved by the anthropologial analysis. The same is true of the issue of whether epidemic disease was a cause of death.

Finally it is to be hoped that future excavations in the churchyard around the Benedictine convent church will turn up more material of importance for the study of the medieval Norsemen in Greenland. (Fig. 59).

Fig. 57. Grave Field II, Skeleton 7, with the closing device (the "zip") (photo, C. L. Vebæk, 1945).

Fig. 58. Heap of bones from demolished graves, placed on top of the north wall of the churchyard, seen from the south (photo, C. L. Vebæk, 1945).

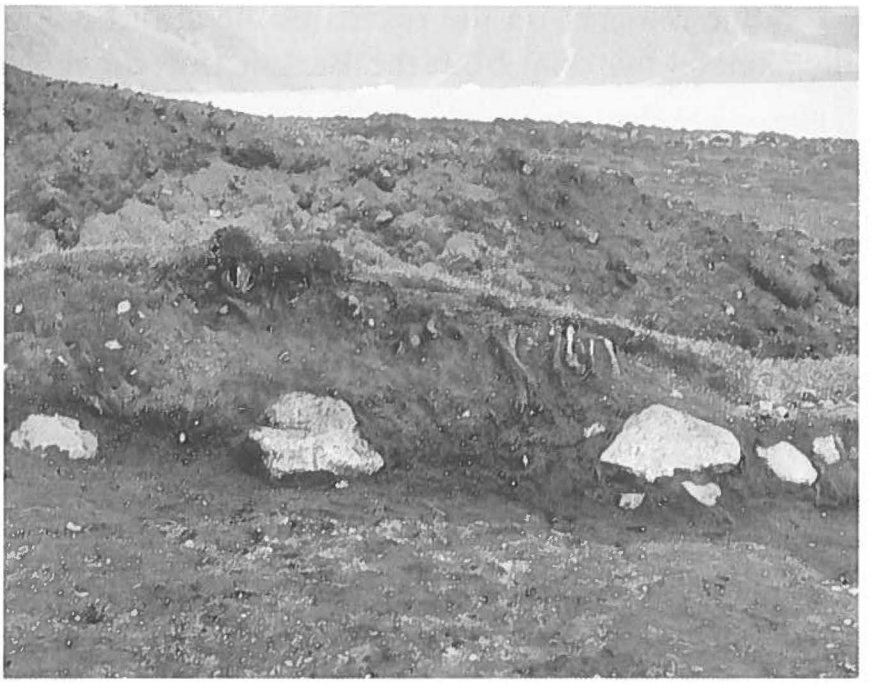
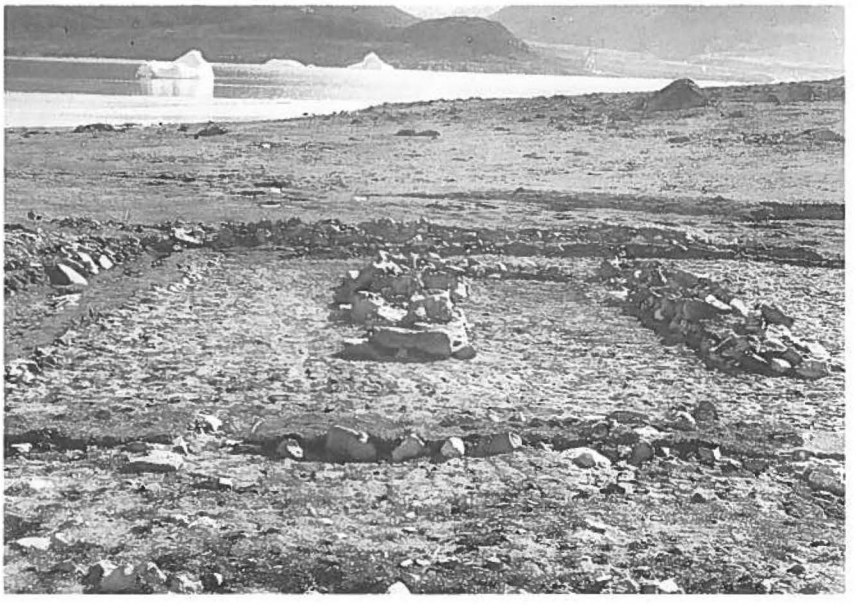


Fig. 59. The church and the churchyard at the end of the excavation, seen appr. from the west (photo, C. L. Vebæk, 1945).



5a. Some remarks on the results of the anthropological investigations of the skeletal material from the Benedictine convent churchyard

In the preceeding section I have described the excavation of the graves in the churchyard. All the material (insofar as it could be removed and taken to Denmark) has been studied by the anthropologists at the Laboratory of Biological Anthropology at the Panum Institute of the University of Copenhagen. As I have mentioned, the anthropologists will publish this material in a separate report, but Dr. N Lynnerup has kindly sent me some preliminary information on their results, including an inventory list of the skeletal material. I will use this information here partly to correct some of what I have written myself, and partly as an overview of the material.

Grave 1 (fig. 42)		
KAL-1133X01[1]	AS 121[2]	Fragment of mandible with teeth. Subadult, app. 13–14 yrs.
KAL-1134X01	AS 121	Fragments of skull and mandible with teeth. Adult age.
KAL-1135X01	AS 121	Teeth. Adult age.
Grave 2		
KAL-1015X01	AS 122	Fragments of skull and mandible with teeth; atlas, axis and two cervical vertebrae. Adult age.
Gravefield I		
KAL-1605X01 skeleton no. 1		Right and left femora and tibiae and left radius. Adult age.
KAL-0995X01 skeleton no. 2	AS 096	Fragment of skull. Adult aged female.
KAL-0996X01 skeleton no. 3	AS 097	Fragments of skull and mandible and with teeth; atlas, axis and one cervical vertebrae. Mature age.
KAL-0997X01 skeleton no. 4	AS 098	Fragments of skull and mandible with teeth; atlas and axis. Adult age.
KAL-0998X01 skeleton no. 5	AS 099	Fragments of skull and mandible with teeth; and atlas. Adult age.
KAL-0999X01 skeleton no. 6	AS 100	Fragments of skull and mandible with teeth; atlas and axis. Subadult, app. 12 yrs.
KAL-1000X01 skeleton no. 7	AS 101	Wellpreserved skull and mandible with teeth. Adult aged male.
KAL-1001X01 skeleton no. 10	AS 104	Fragments of skull and mandible with teeth; atlas and axis. Mature aged male.
KAL-1132X01 skeleton no. 11	AS 105	Atlas, axis, four cervical vertebrae and mandible with teeth. Mature age.
Gravefield II		
KAL-1002X01 skeleton no. 1	AS 107	Fragments of skull and mandible with teeth; atlas, axis and six cervical vertebrae. Mature aged female.
KAL-1003X01 skeleton no. 3	AS 109	Fragments of skull and mandible with teeth; atlas, axis and three cervical vertebrae. Adult aged male.
KAL-1004X01 skeleton no. 4	AS 110	Fragments of skull and mandible with teeth; atlas and axis. Adult aged female.
KAL-1005X01 skeleton no. 5	AS 111	Fragments of skull and mandible with teeth. Adult aged female.
KAL-1006X01 skeleton no. 6	AS 112	Fragments of skull and mandible with teeth; four cervical vertebrae. Adult aged male.

1) Identification number refering to the Laboratory's computerized inventory.
2) Identification number refering to the Laboratory's earlier records of acquisition.

KAL-1007X01 skeleton no. 7	AS 113	Fragments of skull and mandible with teeth; three cervical vertebrae. Adult aged female.
KAL-1008X01 skeleton no. 8	AS 114	Fragments of skull and mandible with teeth. Subadult, app. 7 yrs.
KAL-1138X01 skeleton no. 8	AS 114	Fragments of skull with teeth. Subadult, app. 9 yrs.
KAL-1009X01 skeleton no. 9	AS 115	Fragments of skull and mandible with teeth. Adult aged female.
KAL-1010X01 skeleton no. 10	AS 116	Skull and teeth. Adult age.
KAL-1011X01 skeleton no. 11	AS 117	Fragments of skull and teeth. Adult aged female (fig. 56).
Boneheap 1		
KAL-1018X01	AS 123	Fragments of skull and mandible with teeth. Mature aged male.
Boneheap 2		
KAL-1021X01	AS 124	Fragments of skull and mandible with teeth. Mature age.
KAL-1022X01	AS 125	Fragments of skull. Subadult, app. 10-12 yrs.
Churchyard fence (fig. 58)		
KAL-1012X01	AS 118	Fragments of skull and mandible with teeth. Adult aged female.
KAL-1013X01	AS 119	Fragments of skull and teeth. Mature aged female.
KAL-1136X01	AS 119	Cranial bones and one tooth. Subadult, app. 9 yrs.
KAL-1014X01	AS 120	Cranial bones and teeth. Adult aged female.
KAL-1137X01	AS 120	Cranial bones. Age and sex unknown.
KAL-1651X01	AS 120	Fragment of mandible with teeth. Mature age.
Eskimograves		
KAL-1606X01 Eskimo grave no. 1		Limb bones of right arm, axis, atlas and one cervical vertebra. Adult age.
KAL-0860X01 Eskimo grave no. 2		Fragments of skull and teeth. Adult aged female.
KAL-0861X01 Eskimo grave no. 3		Mandible and teeth. Subadult, app. 15 yrs.
Scattered finds		
KLA-1607X01		Left and right femur. Adult age.
KLA-1017X01	AS 126	Fragments of skull and mandible. Adult aged female.
KAL-1142X01	AS 126	Fragments of skull and teeth. Adult age.
KAL-1016X01	AS 127	Fragments of skull and mandible with teeth. Subadult, app. 10 yrs.
KAL-1024X01	AS 128	Fragments of skull and mandible with teeth. Adult age.
KAL-1671X01	AS 128	Fragment of mandible with one tooth. Subadult, app. 12-14 yrs.
KAL-1019X01	AS 129	Fragment of mandible and teeth. Adult age.
KAL-1139X01	AS 129	Fragment of cranial bone. Age and sex unknown.
KAL-1140X01	AS 129	Fragment of cranial bone. Age and sex unknown.
KAL-1141X01	AS 129	Fragments of skull. Age and sex unknown.
KAL-1664X01	AS 129	Fragment of pelvic bone. Adult age.
KAL-1667X01	AS 129	Fragments of skull. Age and sex unknown.
KAL-1668X01	AS 129	Fragments of skull. Age and sex unknown.
KAL-1669X01	AS 129	Fragment of cranial bone. Age and sex unknown.
KAL-1670X01	AS 129	Fragments of cranial bones. Age and sex unknown.
KAL-1020X01	AS 130	Fragment of cranial bone and mandible with teeth. Subadult, app. 15-20 yrs.
KAL-1600X01	AS 130	Fragment of cranial bone, and teeth. Adult age.

KAL-1601X01	AS 130	Fragment of cranial bone, and teeth. Adult age.
KAL-1609X01	AS 130	Fragment of cranial bone, and teeth. Adult age.
KAL-1666X01	AS 130	Fragment of cranial bone and mandible with teeth. Subadult, app. 8 yrs.
KAL-1023X01	AS 131	Fragments of cranial bones. Adult age.

On the basis of the material made available to the anthropologists, the following statistics have been tabulated:

Distribution by age:

Subadults (up to 12/14 yrs. old):	9
Subadults (12/14 yrs. to 18/21 yrs.):	2
Adult age (18/21 yrs. to app. 35 yrs.):	30
Mature age (more than app. 35 yrs.):	8
Age unknown	8

Distribution by sex:

Females:	12
Males:	5
Sex unknown:	40

Pathological changes:
Ten individuals showed possible degenerative changes in the cervical vertebrae and in the atlanto-occipital joints, while in one individual there was evidence of possible infection in the right atlanto-occipital joint. One individual had a fusion between axis and the first cervical vertebra.

6. The large house complex

Before we began excavating at Narsarsuaq we could observe, to the N (NE) of the church, a very large and uneven, slightly domed, and completely grass-covered heap of ruins, shown as No. 2 in the General Plan. The total extension of this site was not less than 85–90 × 45–50 metres (Fig. 60). At first it seemed natural to assume that we would find the dwelling (or rather the main building of the convent) here. Our excavation did to some extent support this assumption, without directly proving it. Excavation here was very difficult. When the turf had been removed (partly in 1945, and the rest in 1946) an enormous heap of stones, large and small, and all quite confused, appeared (Figs. 61, 62, 63 & 64). On the face of it, getting anything of value out of this confusion seemed a hopeless task. I cannot remember, although I have done a great many excavations during my long career as an archaeologist, encountering excavation problems as difficult and entangled as these. I would go so far as to say that if the site had been of less importance than that of the Benedictine convent, we would never have spent time, hard work – and money – on an excavation here. We would simply not have started. Yet despite all this, during intensive investigations in 1945–46 and 1948, we did at least obtain some results, which will be described below, with reference to the ground plans (scales 1:100 and 1:200) and quite a few photographs of the various stages of the excavation (Fig. 65).

It must be remarked here that only part of the ruin complex was actually excavated (Fig. 66). About half, towards the NE, was in the end abandoned, as the ruins here were so confused that not a single wall line could be followed (Fig. 67).

The part of the large building complex which was examined as carefully as possible turned out to consist of several seemingly separate buildings – at least three, more likely four (and quite probably there were more in the unexcavated part of the complex). In the plan, the two small, separate houses are numbered 2a and 2b, while other units in the excavated part of the ruin (where comparatively distinct wall flights could be followed, and separate rooms, placed in a row and presumably all part of one house, could be observed) have been numbered 2-I, 2-II and 2-III. The room numbered 2-IV, which was in every respect the most interesting house element in the whole complex, and which will be described in detail below, may have been (in fact probably was) a separate building.

There is some uncertainty about the dimensions of Room I, the southernmost room (Fig. 68).We were unable to find the lower courses of any definite walls. However, there was so much rubble at this end of the complex that there had clearly been a room or house here. At the SE end there were a couple of very large stones, which did not seem to have moved (or at least had moved very little), seeming to indicate a wall here. The inside measurements can be cautiously estimated at about 6 × 7 metres (Fig. 69).

The contours of Room II, immediately adjoining Room I, were very definite, as the foundation stones (mainly large boulders) were distinct and lay in their original positions almost all the way round – inside or outside or on both sides. The inside measurements of this room are about 5 × 4 metres. The walls, of which only the foundation stones remain, are 1.5–2.0 metres thick.

Room III is in the same row as I and II, and separated from II by a border of turf about one metre wide. The room stands out clearly except for the NE end, where it was not possible to demonstrate the existence of a wall. But that the room was not longer seems evident from certain features at the ends of the long sides. The inside of the room measures about 12 × 5 metres, and the walls are generally about 1.5 metres thick. The three remaining walls of this room differ greatly in construc-

Fig. 60. Part of the large house complex (General Plan No. 2) still covered with turf, seen appr. from the NE (photo, C. L. Vebæk, 1945).

tion. At the end towards the SW there is a very clear, heavy foundation consisting of large, deliberately selected stones, especially on the outside. At no point does the wall as preserved rise above 0.7 metres. On the long side towards the SE the foundation consists partly of big and partly of rather smaller stones. Finally the long side wall to the NW was built with huge blocks of stone, all to some extent out of their original positions, and has a relatively weak foundation of rather small, rounded stones. The thickness of the wall can only be ascertained at a few points, but seems to have been 1.1–1.2 metres. At no point were there more than two or three stones on top of one other. The five biggest of these stones measured 1.60 × 0.95 × 0.35–0.65 metres; 1.40 × 0.50–0.55 × 0.35 metres; 1.50 × 0.35–0.55 × 0.25 metres; 1.00 × 1.00 × 0.25 metres; and 1.50 × 0.40–0.60 × 0.25 metres (Fig. 70). This cyclopean wall (unparalleled to my knowledge in any medieval Norse longhouse in Greenland) I consider to have been the front wall of the main building at the site – the dwelling

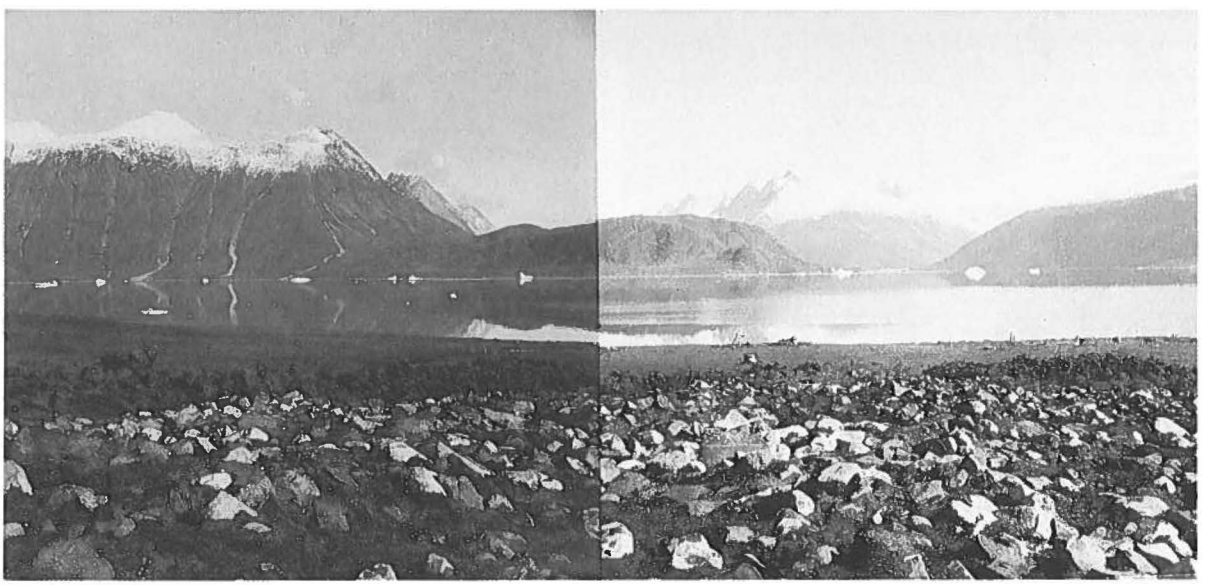


Fig. 61. Part of Ruin Complex No. 2, after the turf has partly been dug away, seen from the SW (photo, C. L. Vebæk, 1946).

Fig. 62. From an early stage of the excavation of Ruin Complex No. 2, seen from the SW (photo, C. L. Vebæk, 1946).

house (but certainly not the whole building – the rest of it must be at the unexcavated end of the complex).

It should be noted that no fireplace was found in any of the rooms described above, and this I find surprising. In fact, no direct evidence was actually found that these rooms made up the dwelling. I should also mention another thing that I wondered much about: we were unable to prove that there had been any doorways between the rooms, or from any room to the outside. So it must be admitted that 2-I/III pose problems. So does 2-IV, but it will be evident from the description below that this had at least at some time been closely connected with a dwelling, perhaps as a separate building.

In spite of these reservations – especially the fact that we found no fireplace in the part of Ruin Complex 2 excavated so far – I nevertheless believe that at least part of the complex was the dwelling-place. We found no other ruin at Narsarsuaq suggestive of a dwelling.

Fig. 63. Part of Ruin Complex No. 2, after the turf has been removed, seen from the SW (photo, C. L. Vebæk, 1946).

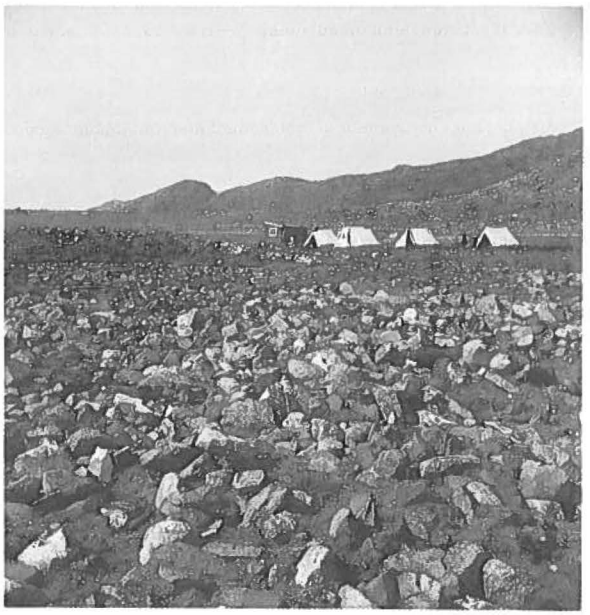


Fig. 64. Part of the southern end of Ruin Complex No. 2, after the turf has been dug away, seen appr. from the NE (photo, C. L. Vebæk, 1946).

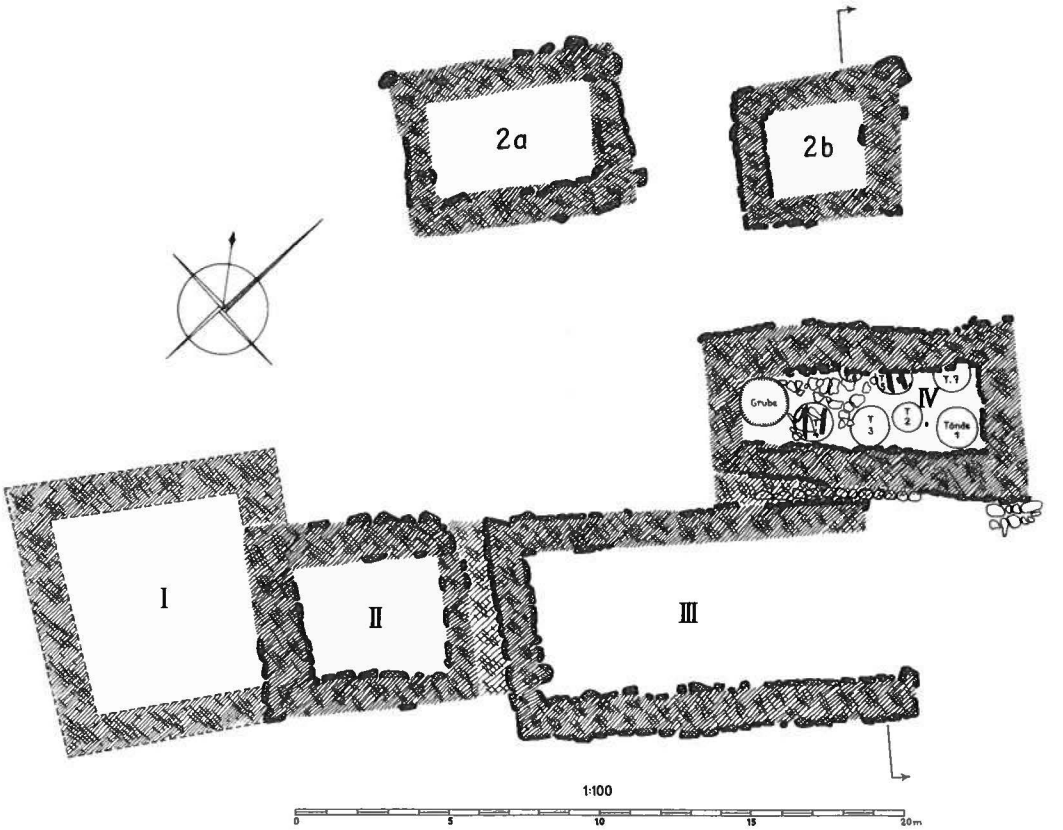


Fig. 65. Plan of the excavated part of Ruin Complex No. 2.

Room (or Building) 2-IV (Plan, Fig. 65)

Immediately adjacent to the NE side of Room 2-II, we excavated a building that was registered as 2-IV, but which in reality must be considered a separate building, with no direct passage to other rooms in Complex 2. Observations of construction details here indicate that Room III was probably built later than Room IV (or at least later than the most recent version of Room IV). Room (or Building) IV was at a slightly oblique angle to Room III, leaving a narrow wedge between III and IV (see plans and photographs). The wedge was filled in with stones and turf, and eleven or twelve of these stones formed a row indicating an earlier building date for IV (Fig. 71). Room (or Building) IV was the most distinct and best preserved in Ruin Complex 2, and had the highest walls (0.5–1.0 metres in 2–5 courses). Its inside dimensions were about 7.8–7.9 metres, its width at the SW end was 1.7–1.8 metres, rising to 2.7–2.8 metres at the other end. The SW end, however, was in comparatively bad condition, and none of the foundation stones appeared to be *in situ* (Fig. 72). That the building must have ended here as shown in the drawing is evident, though, from the long sides of the walls. The walls of the building are about 1.30–1.70 metres thick and are constructed from stones and turf, with comparatively big stones at the base, and smaller ones higher up. We found no definite door opening, but it must have been at the SW end.

Besides the foundation stones from the most recent

Fig. 66. Part of Ruin Complex No. 2, during excavation, seen from the south (photo, C. L. Vebæk, 1946).

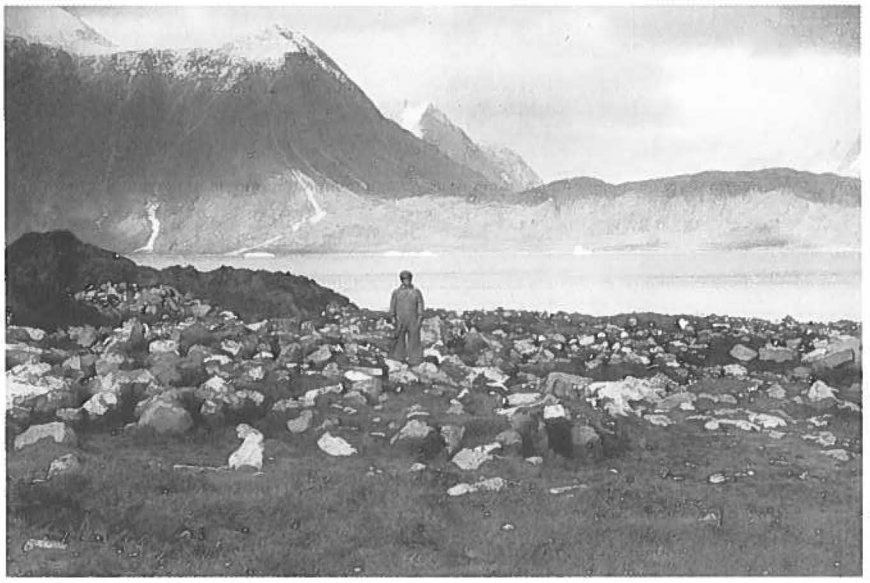


Fig. 67. Part of Ruin Complex No. 2, during excavation, seen from the NW (photo, C. L. Vebæk, 1946).

Fig. 68. Part of Ruin Complex No. 2, at a rather late phase of the excavation, seen appr. from the south (photo, C. L. Vebæk, 1946).

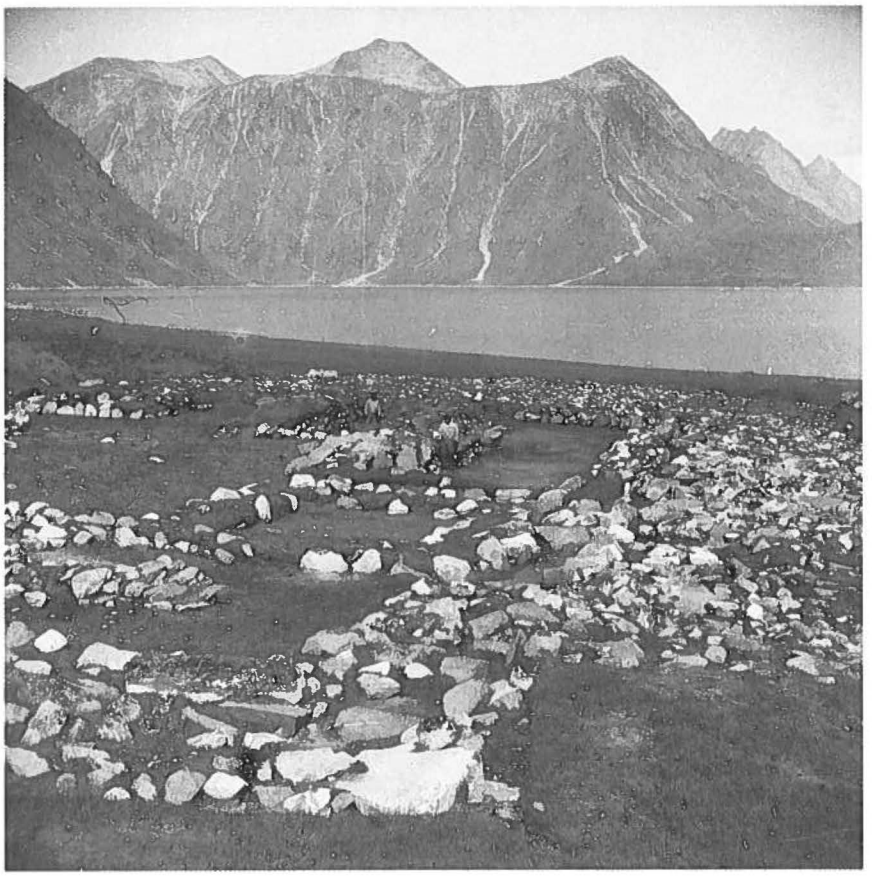


Fig. 69. View of Ruin Complex 2, appr. from the south, at a slightly later stage than Fig. 68 (photo, C. L. Vebæk, 1948).

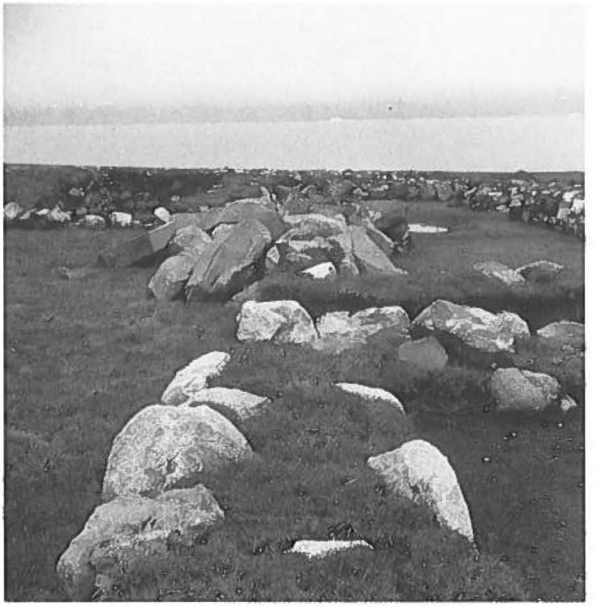


Fig. 70. Part of the front wall of House Complex No. 2, with the very large stones. In the foreground, a corner of 2-II (photo, C. L. Vebæk, 1948).

Fig. 71. The "wedge" between 2-IV (to the left) and 2-III (to the right) seen from the NW (photo, C. L. Vebæk, 1948).

Fig. 72. House (or Room) IV in Ruin Complex 2, seen from the SW (photo, C. L. Vebæk, 1948).

Fig. 73. House (or Room) IV, in No. 2, after the excavation. The man to the right is standing in one of the pits for the barrels (No. 1), seen from the SW (photo, C. L. Vebæk, 1948).

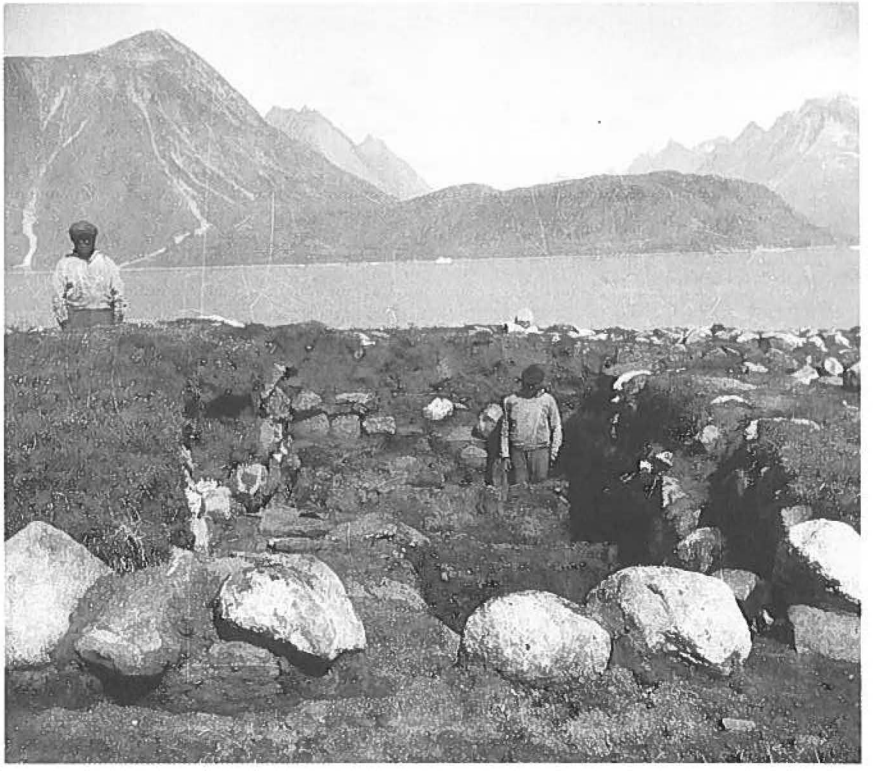


Fig. 74. Ruin Complex No. 2, Room (or House) IV, excavated. The man is standing in the pit for Barrel 5. Seen from the NE (photo, C. L. Vebæk, 1948).

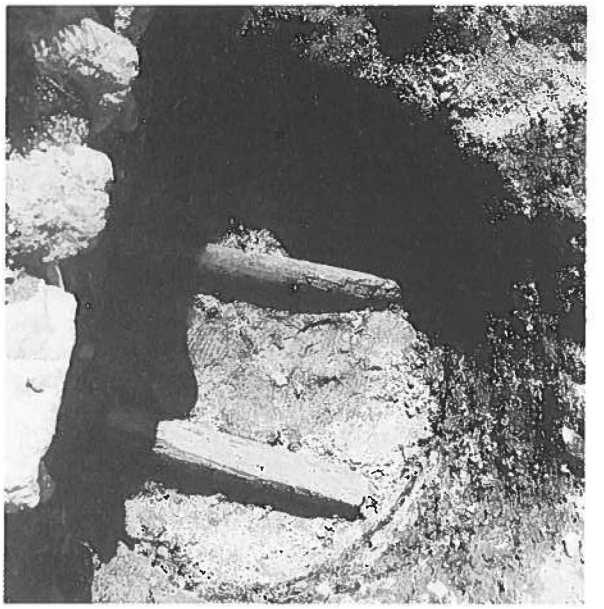


Fig. 75. Ruin Complex 2, Room (or House) IV. The pit for Barrel No. 5, with the two logs on which the barrel was placed (photo, C. L. Vebæk, 1948).

construction we established the existence of another row of foundation stones under both long sides of the walls described above. Building 2-IV (in its most recent version as described above) was, like the other houses at the site, built above an older cultural stratum from an earlier Norse settlement at Narsarsuaq (also evident from remains under the church, *i.e.* the fragments of skeletons mentioned earlier). From this earlier settlement we found, at the bottom of 2-IV, the remains of seven large barrels (or perhaps more correctly, the diggings in the ground for the barrels) with many fragments of the barrels themselves (bottoms, staves etc.), and – just above the barrels – a cultural stratum with a number of fragments of objects of all kinds and many animal bones.

The floor of this building, or at least of its most recent phase, took the form of a covering of greatly dislocated stone flags. Going through the floor were a couple of wooden posts (not shown, unfortunately, in the drawing). One of these was about 0.80 metres long, with only 0.20–0.25 metres above the floor. The other was 0.62 metres long, with about 0.20 metres above the floor. No doubt these posts were part of the roof construction.

Under the flagstones was a cultural stratum with a large number of relatively well-preserved objects of wood and bone, as well as many animal bones. This layer was 0.35–0.40 metres thick and presumably came from the older settlement period at Narsarsuaq (in other words, nothing found here actually had anything to do with the later convent). We excavated the building down to the subsoil and were surprised to find here quite distinct traces of the seven wooden barrels mentioned above. These were of different sizes and will be described below. All the barrels must have been in use at the same time, and as three of them (Barrels Nos. 5, 6 and 7) were partly covered by the long north wall, it can be said with certainty that the building originally had a different contour and size. I estimate that the long NW wall must at first have been at least 1.3–1.7 metres farther to the NW. The contents of the barrel pits were (besides fragments of the barrels themselves) dung, earth, stones and all sorts of rubbish. There was a direct connection with the old cultural stratum above, observable under the walls (Fig. 73).

All this seems to indicate that the barrels were filled in for some unknown reason during the first phase of settlement; but this cannot be proved with certainty. If the barrels were actually filled in connection with the last phase of building here, it is quite probable that the inhabitants used (besides stones and dung) material from the old cultural deposits, both to fill in the barrels and to raise the level of the floor. I must admit that there are some problems of vital importance here, and I do not feel competent to say the last word. This is an example of the need for a geologist who might have solved the problem on the spot.

The following can be said about the individual barrels.

Barrel 1: in the NE corner of the room. The hole, which stood out very clearly, was 1 metre in diameter. The bottom was 0.80 metres below the underside of the wall foundation, while the depression in the gravel was

only 0.20–0.25 metres deep. There were fragments of the barrel itself, including parts of the bottom, and traces of baleen along the sides, near the bottom. Strips of baleen (which must have been used as hoops) were also found in all the other barrels. Barrel 1 was filled with dung.

Barrel 2: This barrel was also distinct, with a diameter of about 1.0 metres, and dug down 0.35–0.40 metres into the gravel. Traces of baleen. Mainly filled in with stones.

Barrel 3: Diameter 1.25–1.30 metres. The hole in the ground 0.60 metres deep. Filled with mixed material, including two logs of the same character and size as those found in situ in Barrels 4 and 5 (as described below).

Barrel 4: This barrel was the one where most of the barrel material itself was preserved, as fragments of barrel staves *in situ,* and large pieces of baleen. The hole had a diameter of 1.25–1.28 metres, and was about 0.55 metres deep. On the bottom we found, *in situ,* two logs on which the barrel has been standing. The two logs were respectively 1.07 metres long, with a cross-section of 0.08–0.09 metres, and 0.65 metres long and 0.08–0.12 metres across. The latter barrel was mainly filled with large stones, some objects, and animal bones.

Barrel 5: Diameter 1.10–1.20 metres, dug down to a depth of 0.40–0.45 metres. On the bottom, two heavy logs, lying parallel. The logs were 0.10–0.16 metres in cross-section. Their length cannot be given as this barrel was one of the three approximately half-covered by the NW wall. In this barrel we also found baleen, fragments of barrel staves etc. (Figs. 74 & 75).

Barrel 6: This barrel, most of which was under the wall, seemed somewhat smaller than the others, with an estimated diameter of 0.70–0.75 metres. The hole, which stood out very clearly, had a depth of 0.50 metres. It was filled with black earth, and there were definite traces of baleen. There were also some animal bones.

Barrel 7: Near the NE corner of the room, and, like Barrels 5 and 6, partly hidden by the wall, with a diameter of 1.20 metres, dug 0.50–0.55 metres into the ground. It was completely filled with stones, and except for faint traces of baleen no finds were made here.

Near the SW end of the room we observed a large, flat, almost bowl-shaped depression in the ground. This depression, which must be regarded as a pit of some kind (but not for a barrel) had a diameter of about 1.50 metres, and went down to a depth of about 0.50 metres. The pit was filled with a little gravel and some very decomposed wood.

The many barrels in 2-IV can only be interpreted as containers for milk and perhaps some other food (fish? meat?). The character of the room (in its oldest form) is certainly that of a pantry. It can be mentioned that barrels like these have been found in other Norse farms – for example, at the Russip Kuva farm in Vatnahverfi (Ø 71) (Vebæk 1952b and 1982), but never as many as here. It is not known whether Building 2-IV still functioned as a pantry at a later time, after the walls had been changed and the floor-level raised and covered with flags; but it is very possible. But if so, all traces of any barrels that might have been standing on the floor, or had been dug slightly in, have completely disappeared, and there was nothing else in the room to indicate its function.

Houses 2a and 2b

In the large ruin complex (General Plan No. 2) it was also possible to identify two "rooms" that must be regarded as separate buildings. These two houses can be seen in the plan (Fig. 65) 3–4 metres north of 2-IV and separated by about 3.5 metres. There is nothing in particular to say about these two buildings. House 2a was rectangular, with inside dimensions of about 3 × 5 metres. Its walls were quite heavy, about 1.15 metres. Nowhere was anything but the foundation-stones preserved. No door could be observed. There were no objects of any kind to indicate the function of this house.

The same is true of the somewhat smaller, also rectangular House 2b, with inside measurements of about 3 × 3 metres. The walls were 0.80–1.20 metres thick, and at some points there were two courses in the wall. As with 2a, there was no visible door.

7. Other ruins

House 3: A comparatively big ruin of confused appearance, measuring about 15 × 25 metres. Not excavated.

House 4: An almost circular building in an opening in the homefield fence (Fig. 76). Its outside diameter was 10.7–11.2 metres, the inside diameter 7.0–7.8 metres. The house had been constructed with large stones at the foundation, but there were very few fallen stones. The wall does not seem to have been higher, but there may very well have been a turf wall above the stones. There was a clear door opening in the east side. The floor was covered with flags. The function of this building is unknown, but it may have been for storing hay (Fig. 77).

House 5: Probably a small pen, at the inner side of the homefield fence, near Ruin No. 4. House 5, which was orientated SE-NW, had only one course of stones, with a wall thickness of 1.5–2.0 metres. The inside measurements of the building were 9–10 × 4–5 metres. Here too we can assume there had been a turf wall on top of the foundation stones.

House 6: A small building constructed with the dry-masonry technique, at the inner side of the homefield fence, near the turning towards the NW. Outside measurements about 6 × 6 metres.

House 7: A building near House 6. Outside, this building measured about 16 × 5 metres. The walls stood out clearly. There were many fallen stones. Inside the

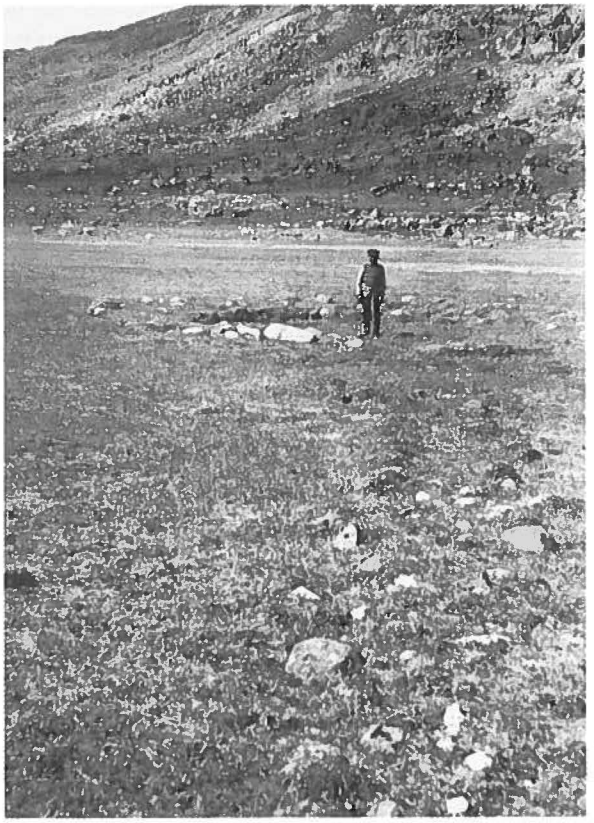


Fig. 76. Ruin No. 4, and part of the homefield fence, seen from the ESE (photo, C. L. Vebæk, 1945).

house were more flat stones, resembling stall-stones, indicating that the building functioned as a byre. (Unfortunately there are no drawings or photographs of this building, nor are there any notes on an excavation of this house).

House 8: A rectangular house near No. 7, but situated in the homefield itself. This is a very low ruin, so in this case too we can assume there was an upper turf wall. The house (which was not excavated) was orientated NW-SE, and had outside measurements of about 15 × 15 metres.

House 9: A large building orientated WNW-ESE, with the WNW end adjacent to the homefield fence. Its outside measurements were about 25 × 5–7 metres. The house had been built with stones and turf and still rose to a height of 1–2 metres, in 3–5 courses. The whole building had been surrounded by a heavy layer of turf, 2–2.5 metres thick, and at some points as much as about five metres thick. The walls themselves were 1.3–1.6 metres thick. The house was clearly divided into two rooms separated by a wall, in the middle of which we found a doorway about one metre wide. The entrance to the house had been from the SE, through a 3–4-metre long, narrow passage, which widened into to a very irregularly-shaped room up to about eight metres long, varying in width from about 2.5 to about four metres. The strange shape of the room is undoubtedly due to the fact that a large natural rock projects into it. That this room was a byre is proved by the existence of between six and eight stalls – or rather, pairs of stall-stones, since each stall seems to have been separated to

Fig. 77. Ruin No. 4, and part of the homefield fence, excavated, seen from the ESE (photo, C. L. Vebæk, 1945).

Fig. 78. The byre, Ruin No. 9, during excavation, seen from the SE (photo, C. L. Vebæk, 1946).

the NW and SE from the next by an adjacent pair of such stones, one big and one somewhat smaller (Fig. 78). Regrettably, almost all the stall-stones had been turned over, or were lying in confusion, partly covering one other. The biggest stall-stones measured about 1.30–0.90 metres and 0.90–0.90 metres. On the floor was paving of various-sized flags and smaller irregularly-shaped stones. (I greatly regret that the stall stones and paving were not drawn in the plan, which is not published here).

The other room in the house had inside measurements of about 11 × 2.5–3.5 metres. The foundation stones in the walls could be traced with absolute certainty. In general the wall had been preserved in 2–3 courses, in a few places in 4–5. The wall was highest (about two metres) at the end towards the fence, but elsewhere measured only 0.6–0.8 metres. The wall between the two rooms, however, was about 1.0–1.1 metres high. The floor was covered with flags, most of them quite large. This room had no stalls and was no doubt a hay barn used in connection with the byre (Fig. 79).

House 10: This was some distance north of House 9, in the homefield fence, or more correctly at a point where the fence was not directly observable for about thirty metres. House 10, perhaps a pen, was rectangular, about 11 × 4 metres (inside). The walls were 1.0–1.2 metres thick. (According to a note the building was excavated, but I am ashamed to say I can find no further information about it in my notebook).

House 11: 80–90 metres north of Ruin Complex 2 was another, smaller complex, which must be regarded as one single large house with many rooms, or as a number of smaller houses built together, but in either case entirely surrounded by a layer of turf about 2–2.5 metres thick. A drawing was made of this complex, and some photographs were taken, where the individual rooms have been designated a-e. The maximum size of the whole complex is about 23 × 25 metres. The following information can be given on the individual rooms or houses:

a: The southernmost part of the building has inside measurements of 3 × 3.5 metres. At a very few points the wall had two stones on top of one other, rising to 0.6 metres; but the walls could be followed with comparative certainty. There was no visible door opening. (In fact there was only one in the whole complex – which is strange, as there simply must have been more doors).

b: A rather obliquely-angled building with inside measurements of about 3.5 × 1.5–2.0 metres. The walls stood well in the lower courses outside, but very badly

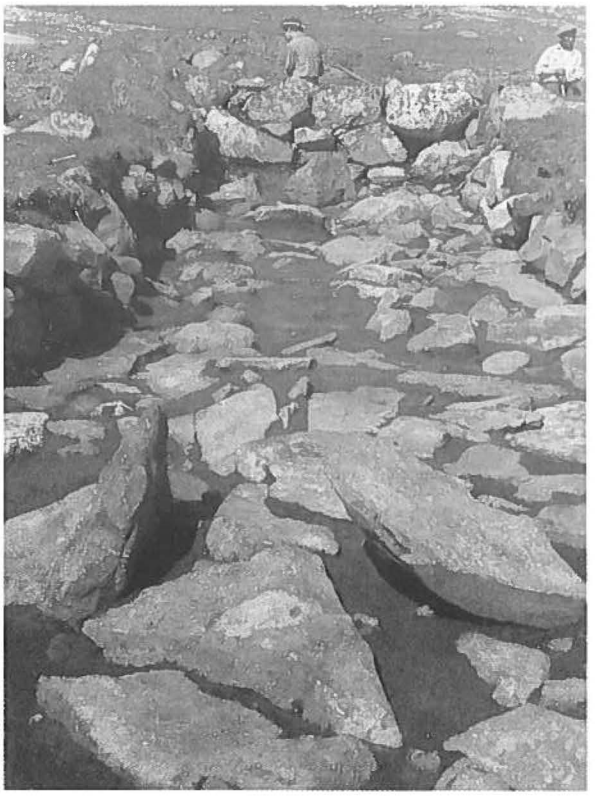


Fig. 79. Part of Ruin 9: the room behind the byre, seen from the SE (photo, C. L. Vebæk, 1946).

inside. The walls were preserved up to about 0.65 metres, with 2–3 courses of stones.

Parallel with and adjoining *b* was *c*, an oblong, very narrow room just 1.5–2.0 metres across, but about 9.5 metres long. The foundation stones were absolutely distinct all the way round, and the outside of the north wall was especially good, with 24–26 stones in a row. It rose to 0.8–0.9 metres, with 1–4 courses, and was 1.0–1.5 metres thick. At the eastern end there was presumably a door, but it had completely collapsed. The floor was mainly covered with awkwardly-shaped stones, and there were only a few flags.

d: this house or room was orientated approximately NS. It was rectangular, and its inside measurements were about 7 × 2–2.5 metres. The 1.30–1.50-metre thick wall had mainly been built with huge stones, but much had collapsed, so the foundation was only in its original position at a few points. Similarly, the wall had only at a few points been preserved to a height of 1.00–1.50 metres with 2–3 courses.

e: We could follow definite contours of a wall towards the north, a continuation of the east wall of *a*, for a distance of about 5.5 metres. This means there may have been a room about 5.5 metres long and 3.5–4.0 metres wide. There were no certain traces of a wall to the north. No observations were made that indicated any room between *d* and *e*; but according to my notebook *c* and *d* were not completely excavated (I do not know why). There was nothing in Building Complex 11 suggestive of a dwelling, so the whole ruin must be regarded as a complex of outhouses whose function it is impossible to say anything about.

House 12: East of 10 and 11 was a small, very low – in fact, somewhat doubtful – house. Outside measurements about 8–9 × 8–9 metres.

House 13: Between No. 2 and No. 11 was a rather large house ruin, possibly divided into several sections, measuring about 30 × 7 metres on the outside. (This house was not excavated).

House 14: A rectangular, low pen, built of rather large stones. One of the long sides followed the inner side of the homefield fence. Outside measurements were about 9 × 7 metres.

House 15: A small, square, completely-collapsed ruin, against the inner side of the fence. Outside measurements about 6 × 4 metres.

House 16: NW of House 11, inside the homefield fence. A very low ruin, with outside measurements of about 15 × 6 metres. There appeared to have been a door opening in the west side. As there were no fallen stones the walls may be presumed (as in some other cases mentioned above) to have consisted mainly of turf that had completely decomposed.

House 17: This was the only ruin found east of the small river. A comparatively large ruin, completely collapsed, with outside measurements of about 10 × 6 metres (not excavated).

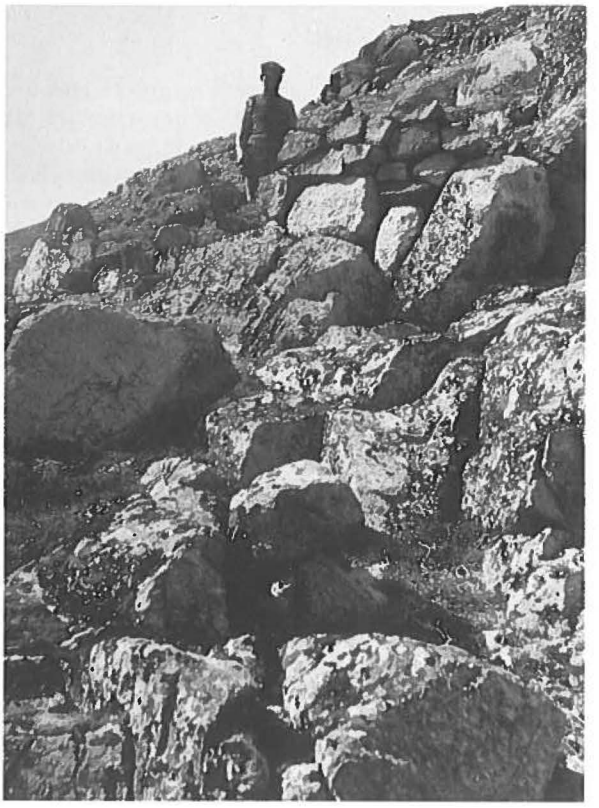


Fig. 80. Ruin No. 21, seen from the east (photo, C. L. Vebæk, 1945).

House 18: This house was about 70 metres WNW of House 17. It is a fairly distinct ruin, with outside dimensions of about 7 × 3.5 metres, and inside measurements of about 4.5 × 1.6–1.8 metres. The wall partly consisted of large and small rounded stones in 1–3 courses.

Houses 19, 20 and 21: In the General Plan these ruins are shown outside the homefield, about 200–220 metres WNW of the fence, a little up the mountain slopes. Regrettably there appears to be no separate description of these houses; but they were all undoubtedly dry-masonry constructions, possibly sheep pens. From the plan it is clear that No. 19 is a rectangular building, about 8 × 4 metres, No. 20 a fairly small, rectangular building of scarcely more than 4 × 2.5 metres. Finally, No. 21 is a couple of rooms built together up against some huge stone blocks (Fig. 80).

The possibility cannot be excluded that there were more ruins on the mountain slopes behind the convent than those registered by us. The same may be true even in the homefield, or in the areas just outside it. It was quite simply extremely difficult to identify ruins on this site (as has no doubt become evident from the descriptions above).

8. Objects found

During the fairly extensive excavations at Narsarsuaq in Uunartoq Fjord in 1945–46 and 1948, several objects of various kinds were brought to light. In general, reference may be made to the summary of objects given later in this paper. Here I would like to make some general remarks on the material and indicate certain finds of more particular interest.

Perhaps the most important objects are those bearing runic inscriptions and a unique artefact of wood which, according to nautical experts, was undoubtedly a sort of compass. The latter find will be separately described in Section 8b by Søren Thirslund, and the runic inscriptions in Section 8a by Marie Stoklund. In connection with the find of the sun-dial must be mentioned the find of a complete circular disc, of nearly the same size, with some incised circles, this object may – according to the nautical experts – be a sort of an unfinished nautical instrument (Fig. 84). Among the various finds at Narsarsuaq there were – as is common at Norse sites – a great many fragments of vessels and other objects of *steatite* (for example, spindle-whorls, weights for looms or for fishing); but none were of special interest, and I will publish no photographs of such objects here. Then there were a small number of objects of *iron*, one of which seems to be unique. This is the above-mentioned "chain of iron" (with a few elements of bronze), found with one of the churchyard burials (Skeleton 7 in Grave Field II) (see Fig. 57). This consists of about fifty small metal elements that had been sewn on to the garment at the left side, undoubtedly placed alternately on each side of a placket in the coat, so it was possible to close it with a cord, which may have been made of wool. We might call this closing device a kind of "zip". If so, it is the oldest of its kind known so far (Fig. 81).

Of iron objects, there was also a single knife – a little strange, as iron knives are generally among the more common finds in Norse farms. There were also a few objects made of *bronze*, including a fragment of a church bell found in the churchyard. Here (as in all other Norse farms) when the Norsemen had disappeared, the Eskimos moved in and looked for any metal they could use for weapons, hunting implements, knives etc. So the Eskimos are bound to have crushed all the

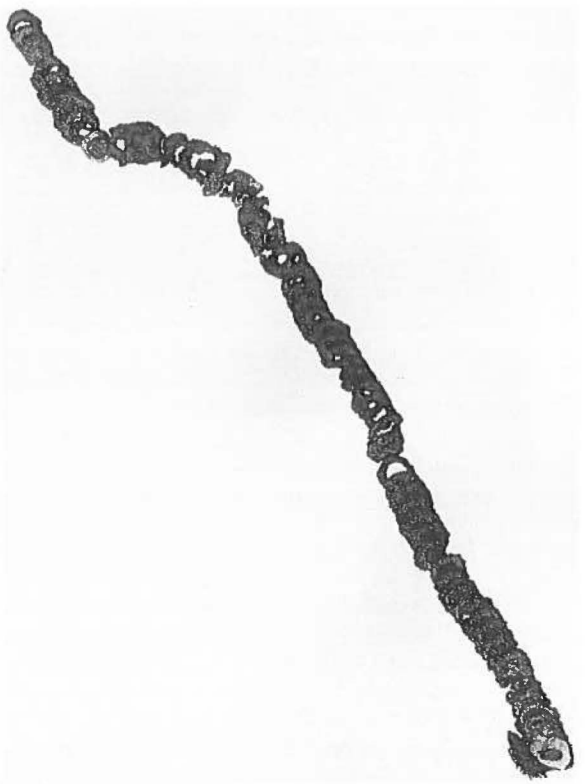


Fig. 81. A "chain" of small metal links (most of them of iron, a few of bronze), found with Skeleton 7, Grave Field II in the churchyard (*cf.* Fig. 57). The small elements seem to have been sewn alternately on each side of the placket that seems to have been on the left side of the garment, so the garment could be closed by a cord passed through the small links. It might perhaps be regarded as a kind of "zip" (ca. 30 cm).

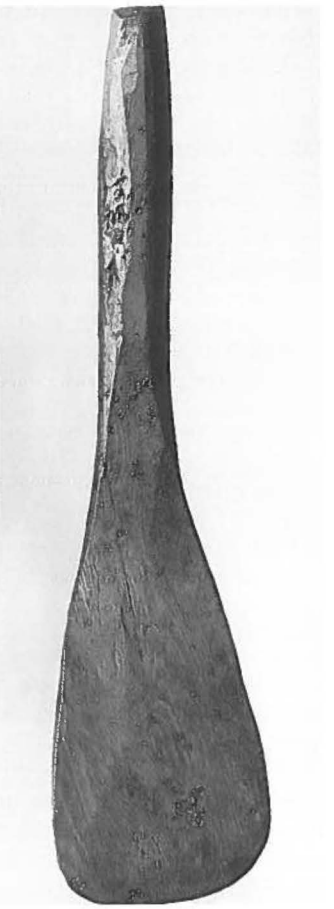


Fig. 82. A wooden ladle (ca. 30 cm).

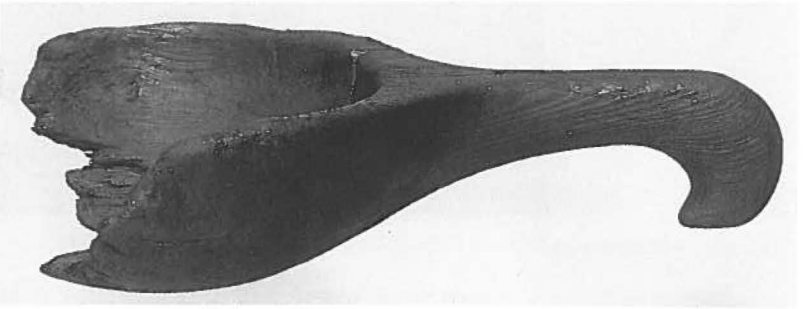


Fig. 83. A wooden scoop (ca. 25 cm).

church bells, and only fragments of them can now be found.

Among the finds were two *glass* beads: one quite small and dark blue; the other a rather larger, completely spherical and translucent white bead with a very narrow perforation. Both were of European seventeenth or eighteenth-century origin, and it can even be determined that the white bead was made in Amsterdam. So these had nothing to do with the medieval Norse settlement. They must have come to the Eskimos from European whalers, and are among the very few objects that can be connected with Eskimo activity at the site (apart from the three graves described above).

There were a large number of *wooden* objects, especially barrels and vessels of various sizes, almost all found in House 2-IV, in the lower deposits (which must be from before the convent, at least in its most recent form with the extant church ruin). A number of these wooden finds are shown in Figs. 82–83 and 85–90.

Fig. 90 shows two fragments, undoubtedly from the same object, although they cannot be assembled: some part is missing. These were two long sticks, specially cut to fit completely tightly together and lashed together. The material is willow, and the lashings were made from roots, also of willow. The function of this object is unknown, but it may have been a special hoop for one of the seven large barrels in 2-IV (where the object was found). Hoops for barrels, as we have seen, were generally made of baleen.

The object shown in Fig. 91 is quite unusual. It looks like a beaker (?), but no bottom has been preserved. It is about 7.7 centimetres in height, with an outside diameter of about 66 centimetres. The thickness of the wood varies from 6 mm to just 1–2 mm above, and 4 centimetres below a sort of beading has been cut out, just 5–7 mm broad and a few mm thick. The object is rather fragmentary, and it cannot be said with certainty what its function was. One thing is sure: the material used for this strange object was birch wood.

There are some implements of *bone*, among which I can particularly mention a pair of very fine needles, one with a fragment of twisted woollen thread still running through the eye (Fig. 92).

Among the objects found at Narsarsuaq, there are a few that may be of *Eskimo* origin, but – apart from the above-mentioned glass beads – only one seems indis-

Fig. 84. A circular disc of spruce or larch with incised circles – perhaps a half-produce of a sun-dial (diam. ca. 6.5 cm).

Fig. 85. A game counter (?) (chessman?) of wood. (Height ca. 6 cm).

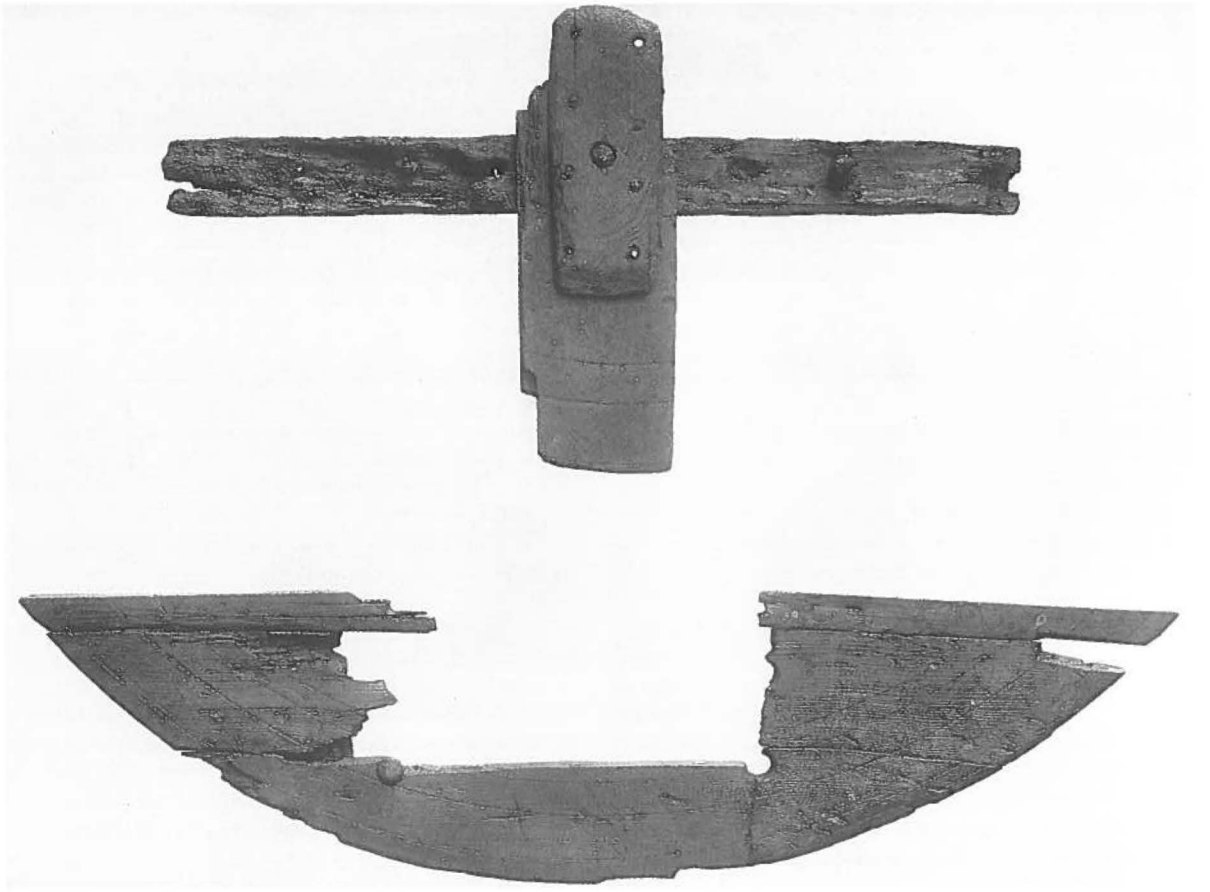


Fig. 86. Fragments of the bottoms of two wooden tubs. (Length of the fragment below ca. 90 cm).

putably so: a certain type of fishing implement for use in fishing for sea-scorpions (and perhaps other fish). The implement is made of whalebone, and at its lower, heavy end are two perforations to which a pair of hooks (undoubtedly made of bone and now missing) would have been attached. This type of fishing implement is common on the west coast of Greenland and in Arctic Canada. It is known from finds from the area around Nuuk that can be dated to the fourteenth and fifteenth centuries, but may well be older or more recent. If our specimen from Narsarsuaq is from medieval times, the Norsemen may have acquired it from the Eskimos, perhaps on one of their hunting trips to the Northsetur in Northern Greenland (Fig. 94). Except for the objects of Eskimo origin (or later European) all other objects found at Narsarsuaq are presumed to have been of local, Norse origin. Of course there is the possibility that the sun-dial and some of the other wooden objects may have been imported from Norway (or Iceland), but I feel fairly sure that the objects of wood in general were made in Greenland from drift-wood or from local wood, *i.e.* birch, juniper, and willow. I feel quite sure that all objects made of bone, antler, tooth, and steatite are local products.

Finally, among the Norse finds from Narsarsuaq I must mention a very strange object apparently made from a cow's horn. It is very difficult to describe this curious object, which seems to have had no practical function. It may have been some sort of art object, or perhaps a toy. The figure seems to be a sea monster or some other fabulous animal; at one end there is a suggestion of a head (Fig. 93).

It would be tempting to mention several more of the interesting finds from Narsarsuaq, especially objects of wood, mostly from 2-IV, but I fear I must set a limit and refer in general to the list of objects excavated at Narsarsuaq given later in this book.

But a few more objects must be given special mention. Figs. 88–89 show a biggish, carved wooden board, whose function is unknown. It is interesting, however, that this object is ornamented on both sides, and that we have parallels to this ornamentation in the finds from Ø 17a, Narsaq – undoubtedly a *landnáma* farm that may have been built around the year 1000. This

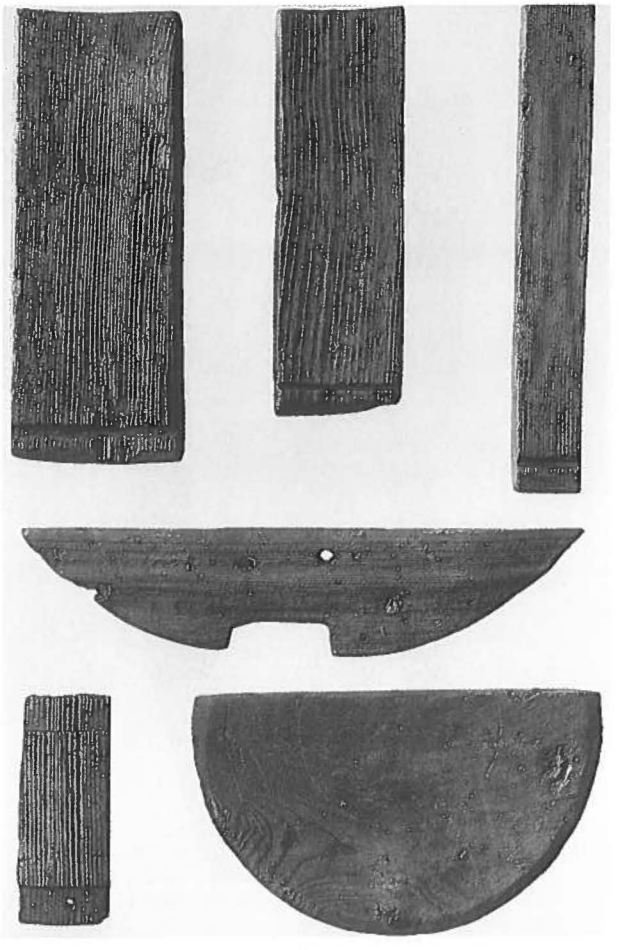


Fig. 87. Two fragments of the bottom of wooden tubs, and four tub staves. (Diam. of bottom below ca. 18 cm).

Fig. 88. An ornamented board (one side). (Length ca. 23 cm).

find really confirms that the settlement at Narsarsuaq goes back to the *landnáma* period.

Fig. 102 shows a find to which I know of no parallel from any Norse site in Greenland: a large fragment of a heavy, twined rope of juniper withies. In fact we have two fragments of this rope, but they cannot be connected. The picture shows the biggest fragment, about two metres long, and between four and six centimetres thick. The construction of the rope is somewhat complex, so I shall not try to describe it. Its exact function is unknown, but in my opinion it may have been used for mooring a boat.

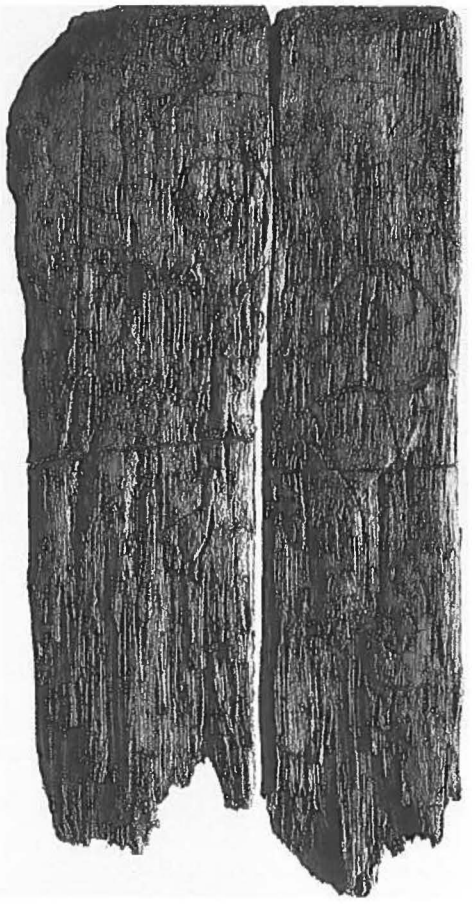


Fig. 89. As Fig. 88, but seen from the other side.

Fig. 90. Fragments of a hoop for a wooden barrel (?). (Length of longest fragment ca. 30 cm).

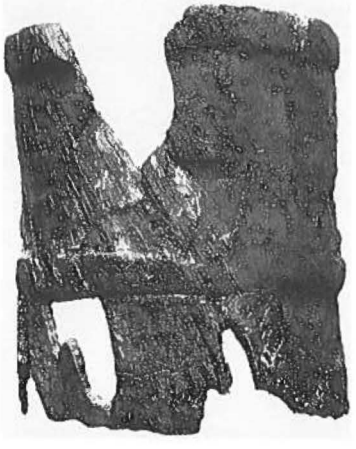


Fig. 91. A beaker (?), made of birch wood (height ca. 7 cm).

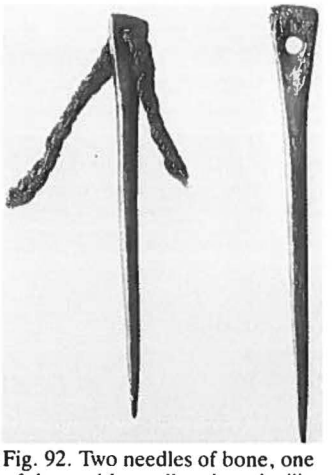


Fig. 92. Two needles of bone, one of them with woollen thread still in the eye. (Length of longest needle, ca. 11 cm).

Fig. 93. Unidentified object, made of a cow's horn. (Ca. 20 cm between the ends).

Fig. 94. Fishing implement of whalebone. Of Eskimo origin. (Length 10 cm).

8a. Marie Stoklund: Objects with runic inscriptions from Narsarsuaq

Only three objects with runic inscriptions were found during the excavations in 1945–46 and 1948 (besides two steatite net-sinkers or loom-weights with rune-like markings). But although they are short or even fragmentary, these runic inscriptions are of far-reaching significance.

Spoon (wooden) with broken bowl. No. 27, found in House 2, Room IV (possibly a pantry) (Fig. 95). It is most unfortunate that we have been unable to find this spoon for many years, so I have not seen it. But thanks to a drawing (1:1) by the late Peter Linde, and the excellent photographs taken by Lennart Larsen, we are able to give an absolutely safe description of the find. The fragment measures c. 17 × 3.5 × 2 cm (max.). With its long, decorated handle, it is a rather early type, and such a spoon must have been a luxury, as people probably ate without spoons (Granlund 1970: 451–458, with references). However, some spoons and a spoon case are known from Aage Roussell's excavations at Kilaarsarfik and Umiiviarsuk (1936: 148–150).

Here we have a fine example of the type of inscription that specifies the object by name: "spoon" is written twice on the handle. The word **s b o a** has been written with three-centimetre-high "knot-runes" (I prefer this designation of Aslak Liestøl's to the "ribbon-runes" sometimes used) then corrected with a common n-rune to **s b o n**, Old Norse *spónn*. At the top of the handle (turned upside-down) it has been repeated with ordinary runes about one centimetre high. A double-contoured "knot-r" has also been incised on the back.

Fig. 95. Handle of a spoon, about 17 cm long. With the runic inscription **sbon**.

Fig. 96. Fragment of a tub stave, 8.6 x 6.0 cm, with a runic inscription.

A very interesting feature is the use of the special interlaced "knot-runes", since they are known from a stick from Bergen and a bugle cut from walrus tusk now in the Museo Nazionale in Florence, but probably Norwegian and from the end of the thirteenth century (Liestøl 1979: 228–234). However, these runes are also found earlier on a rune-stone from Gästrikland in Sweden, probably from as early as the end of the eleventh century (Gs 15 Ovansjö) (Jansson 1981: 162–175). Dating is thus difficult, but finding a spoon with such runes in Greenland reflects close runic contacts within the Northern world: whether the spoon was imported or carved in Greenland, it tells us something of connections abroad. Incidentally, similar interlaced figures on a wooden object from Ø 2 Tasiusaq, D 130/1956, could hardly be taken for runes.

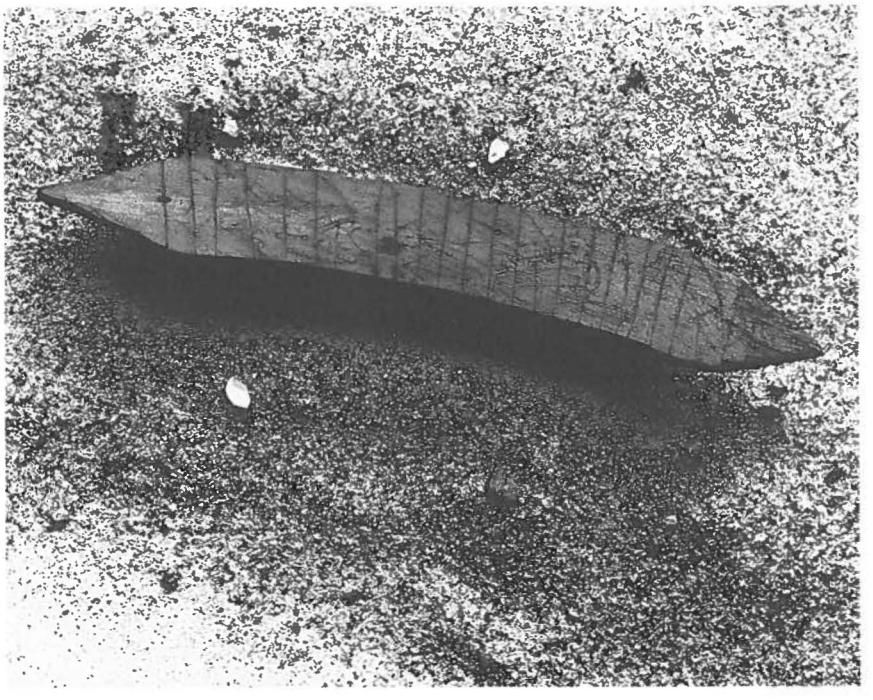


Fig. 97. Rune stick, 13.8 x 2.0 cm, front.

Fig. 98. Back of rune stick, Fig. 97.

Fragment of a barrel stave (Pinus sp. The National Museum's Department of Natural Science, NM VIII A7001). No. 37, found in House 2, Room IV. (Fig. 96). 8.6 × 6 × c. 2 cm. The fragment comes from a large barrel (No. 4). The runes were placed in one row along the stave on the concave (*i.e.* the inner) side of the barrel, and were made before the incision for the bottom was cut, which has destroyed the lower part of Rune 5. Only a small piece of the lower part of the first rune has been preserved, followed by two faint stabs of a division mark, which may have had three or four points. The following runes are 7–8 cm high:

. . ? : a s k ? (?) . .

For contextual reasons the third rune has been taken to denote *s*, though in Norse inscriptions it generally denotes *c* or *z* and only occasionally *s* (the opposite of Danish usage). Rune 5 could be *i*, but it is hard to say if the top of a side stroke, which does not touch Rune 5, belongs to the following Rune 6 (*m*), or possibly to Rune 5 (*u*, *r*, *b* in that case). Of course it is hazardous to venture an interpretation, considering the fragmentary character of the inscription; but a personal name, for instance *Áski* (short for *Áskell, Ásgautr, Ásgeirr, Ásulfr*) or *Askr,* orig. "ash", used of the first man according to Snorri's Edda, is a possibility. It should also be mentioned that Old Norse *askr* could also mean "vessel" and could be used as a fluid measure (10.8 litres (?)) (Stigum 1956: 269), though it is rather difficult to read the context as a reference to the capacity of the barrel.

Stick (Juniper sp., which grows in Greenland. National Museum, Department of Natural Science, NM VIII A7001). No. 175, House 2, Room IV. 13.8 × 2 × 0.5 cm, pointed at both ends and smoothed before the runes – twenty on one side (Fig. 97) and five on the back (Fig. 98) – were carefully cut. The inscription must be complete. The reading is complicated somewhat by the many scratches running parallel with the side strokes of the runes, but the earliest photograph and drawing (Peter Linde, before conservation (?)) support the following reading:

ę a l ᚼ ᚼ r u n i t t r i ⋮ þ u k i r þ i
r ᚼ a s t

Rune 1, *e*, could possibly be read *i*. The point could be secondary: it is bigger than the five neat points in the division mark (obviously stabs of a knife) and the dot on Rune 24, *s*.

If the lower twig on Rune 5 is incidental it could be read *n*, but considering the early pictures and Erik Moltke's original reading (in a letter to Vebæk 1949) I am inclined to read ᚼ. The tendency to repeat runes might suggest an interpretation of the inscription as magical, without linguistic sense, at least as regards the runes before the division mark. It might be possible to interpret the latter part as Old Norse *þú gerðir óast*: "you did fear" – *gera* used like English "do". But this looks more like a purely formal possibility, without much real likelihood. The reading of ᚼ as *o* is problematical: in a late inscription it generally represents *nn*, and ᚼ normally denotes *o*, and the inscription is from the older settlement. If it is very old, then ᚼ would be nasal *a*, or perhaps *b*, as on the Narsaq stick 1, but this is unlikely if we read Rune 1 as *e*.

8b. Søren Thirslund: A presumed sun compass from Narsarsuaq

In 1945–46 and 1948 a Danish National Museum expedition led by the archaeologist and historian C. L. Vebæk carried out some topographical and archaeological investigations at sites of the Norse Eastern Settlement in Greenland. Activities were concentrated on the excavation of Site Ø 149 at Narsarsuaq in Uunartoq Fjord. This is undoubtedly the site of the only known Benedictine convent in Greenland. At the site there is a church (completely excavated), a churchyard (partly excavated) and several buildings of various kinds. Reference may be made to the General Plan (Fig. 24) and the descriptions in some of the foregoing chapters.

In one of the houses (No. 2 in the General Plan) a unique find was made in Room III. This find will be described in more detail below, but before doing so, I must at once point out that the object, a small fraction of a wooden disc, was found in the lower layers of the house, and like most of the finds from House 2 undoubtedly dates from a very early settlement here before the convent was established – perhaps as far back as the *landnáma* period (Fig. 99 & 99a).

The find is a small wooden disc shaped like a half moon. The two straight edges appear to have been broken off from a larger (perhaps circular) piece of wood. It is seven centimetres in diameter, and about one centimetre thick. The straight edges show a semicircular cut in the middle, probably part of a hole with a diameter of about 1.8 centimetres. At the rounded outer edge on one side there are sixteen or seventeen triangular notches arranged like the compass points in later compasses, and ten of these are in fact placed at angular intervals of about 11.25°, which is the way the 32-point compass card is divided up. The remaining notches are confusing, as their division is irregular, and one may have been erased – hence the alternatives sixteen or seventeen. Both flat surfaces have many scratches, some of them perhaps from slips of the craftsman's tool; but some of the scratches on the same side as the notches appear to have been cut on purpose. There are about sixteen small parallel lines near one corner, and two lines extending across the body of the disc. One is curved, the other is straight. For the past

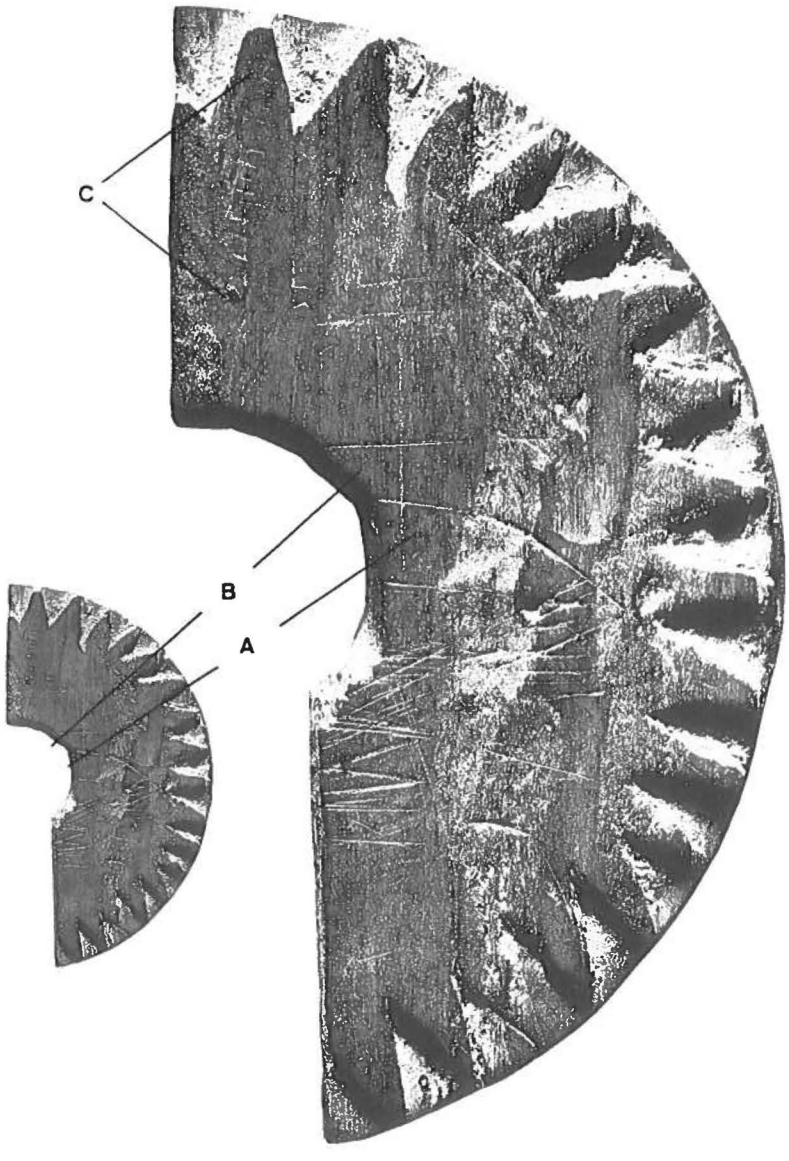


Fig. 99. The sun compass disc of spruce or larch wood. On the left natural size (diam. ca. 7 cm), on the right enlarged. "A" marks the gnomon curve for about summer solstice. "B" marks the gnomon curve for about equinoxes. "C" about 16 small scratches marking perhaps North.

eight or nine years these lines have been receiving more attention, as they may change the interpretation of the function of the disc.

The wooden disc and the other finds were taken to the National Museum for conservation and closer study. The first time some of the objects were publicized was in an article written by C. L. Vebæk in the *Illustrated London News*, May 3, 1952 (Vebæk 1952a: 764, Fig. 9). Vebæk published a photograph of the disc with some other objects. As he had no idea at the time of what it might be, the caption of the photograph was naturally "Use unknown".

The *Illustrated London News* is read all over the world, but the only reaction was to come from nearer home. The famous Danish navigation expert, Captain Carl V. Sølver, was at that time director of the old Danish nautical supplies company, I. C. Weilbach (established in 1755). His office was about 1500 metres from the National Museum. He read the article, saw the picture, and had no doubt whatsoever. He at once contacted Vebæk and went down to the Museum. He examined the disc and then said: "There is no doubt at all – this is a sun compass, a bearing dial". In the following weeks Captain Sølver examined the object more closely, and had a specialist in wood-carving make a reconstruction of what he considered the original appearance of the instrument. The reconstruction was made of oak, but this is a mistake. It has since been examined by an expert, who has stated that the material is spruce or larch, probably driftwood. It is to be pre-

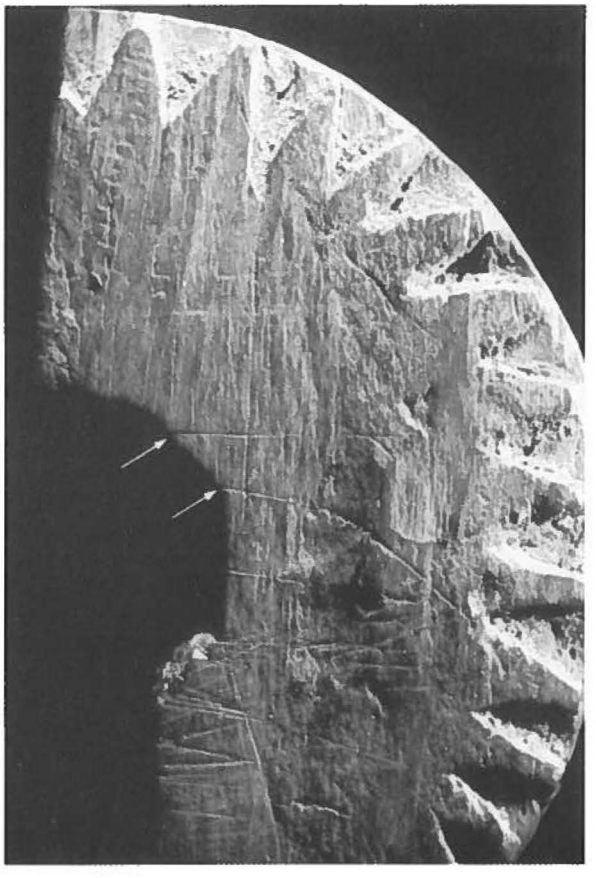


Fig. 99a. Detail of the sun dial. The arrows are pointing towards the line of the equinoxes (upper), and the summer curve (lower).

sumed that the object was made in Greenland, but of course the possibility cannot be completely excluded that it originated in Iceland or Norway. In 1954 Captain Sølver wrote a book, *Vestervejen* (1954), on Norse navigation in the early Middle Ages, and of course the sun compass was carefully described there.

In the pictures, Captain Sølver (1954: 85, 129) showed how he believed the instrument was used, both in daylight and in the dark hours. We have evidence that the navigators of that time had some knowledge of the position of the sun during the day. It may have been based on the kind of "internal clock" Sigurd demonstrated to King Olaf (*Hauks Bók*); or it may have been done by comparing the height of the sun over the horizon with some mnemonic azimuth table. During the night they had the Pole Star, which they called the "Guiding Star".

The navigator would place himself aft in the vessel with the instrument held level in his hand. To make the bearing dial show the true direction, he would have to make the direction to the celestial body coincide with the same reading on his bearing dial. For instance, if the sun rose in the ENE, its shadow would be in the WSW; and with the small shadow pin at the centre and the course pointer, he would have a true compass to put his vessel on the desired course, which he could instruct the helmsman to steer by watching the direction of the pennant, some cloud ahead, or the shadow of the mast. At intervals the navigator would check that the vessel was on the right course or would correct it. At night he would use the Pole Star. In the trade between Norway and Greenland the course was true west or east, which meant that he just had to keep the Pole Star abeam. He may even have had knowledge of the slight circular movement of the Pole Star round the celestial pole (Fig. 100).

Captain Sølver wrote about his interpretation in many articles as well as his book *Vestervejen*. We, the navigators of his day, admired him for his research, and many of us would probably have reacted if we had known that he met so much resistance from people who thought they knew better. In the *Journal of the Institute of Navigation*, July 3, 1953, Sølver wrote an article on his interpretation (Sølver 1953). Soon afterwards four experts (Taylor, Lethbridge, May and Motzo) published their views in the same periodical (1954). Three were strongly against Sølver, but it is interesting to note that none of these had any experience of practical navigation. One of them, Commander W. E. May, took a positive view – not surprisingly a man who had navigated himself for many years. But his vote was not enough. Because of the adverse criticism from the other three and some museum-people, the object was never exhibited at the National Museum. C. L. Vebæk greatly

Fig. 100. Carl V. Sølver's reconstruction of the sun compass. The sun is in the SSW. The shadow is to the NNE. The small parallel scratches indicate the north. The course indicator accordingly shows that we are sailing towards the west.

regretted this, as he had always felt sure about Captain Sølver's interpretation.

Captain Sølver reacted mildly to his critics. A friend of mine, Captain G. Stallknecht, was for many years Sølver's right hand at the Weilbach Co., and became his successor. He has told me that Sølver simply shook his head and said they just did not understand practical navigation. He did not abandon his idea as long as he lived.

The criticism came from E. G. R. Taylor, R. B. Motzo and T. C. Lethbridge. None of these had ever seen the disc except in pictures, and it appears that they never did any practical tests with a copy of it. If they had, they would probably have reacted more favourably. The navigator W. E. May and we other practical navigators understood that here, for the first time, we had evidence that the early navigators of the North Atlantic had some kind of compass, and it is hard to understand why it took so many years for it to be put to a practical test.

For some time very little was heard of the object. In the late 1970s, however, something happened. The Swedish astronomer Dr. Curt Roslund came to the National Museum and asked for permission to examine the disc more closely. Besides being an astronomer, Roslund is very interested in early navigation. In the pictures in *Vestervejen* he had seen a curve he thought could be interpreted as a *gnomon* curve. This would indeed change the interpretation of the use of the disc. After examining the disc, Dr. Roslund felt sure that the curve could be part of a *gnomon* curve.

Gnomon is the Greek word for a kind of vertical pole placed on a horizontal plane. If placed so the sun can shine on it throughout the day, its shadow will follow the same pattern for a period of a few days – long in mornings and afternoons, shortest at noon, when the shadow will in our latitudes point due north. This fact may be applied to the capabilities of a Norse navigator as follows. When planning a voyage to or from Greenland, he would place a small circular piece of wood on a level surface. At the centre he would place a nail, or, as an even better indicator, a cone. At intervals during the day he would mark the end of the sun's shadow, and in the evening he would connect the marks with a line. This line is the gnomon curve for that particular day (but in practice also for a few days ahead, depending on the time of year). A straight line through the centre and the point in the curve closest to the centre is the north-south line, and given that line the navigator could divide his compass.

A compass made as described would be a very useful instrument for voyages in the same latitude on courses due west or due east. It is interesting to note that if the navigator used a compass made this way at some time near the summer solstice, but was, say, one month away from that time, then in the mornings he would be taken away from his latitude. Around noon he would steer with the sun abeam, but in the afternoon when he again used the curve on the sun compass, he would be brought back to his latitude. The distance lost this way would be a few nautical miles.

The late Danish archaeologist Thorkild Ramskou and Curt Roslund had a discussion about this idea, and Ramskou wrote a book about it called *Solkompasset* (The Sun Compass) (1982). I bought the book immediately as I find the idea extremely interesting, and I began to experiment with it.

In 1985 Dr. Curt Roslund wrote an article on the way he thinks the Vikings found Vinland (Roslund 1985). The gnomon curve is a hyperbolic curve, and can be constructed in two ways. It may be presumed that the Greenland disc was constructed in the way described above; or the navigator may have had a pattern after which he could carve it. Today we can use nautical tables. The curve depends on three variables: the geographical latitude, the sun's declination (its angular distance from the celestial equator) and the height of the gnomon. I have obtained the mathematical formula for the curve, and a friend of mine has done a computer printout of all the curves for the declinations from 23° North to 23° South, for the average latitude for Denmark, 56° North, and for a 20 millimetre gnomon. The curves are printed on compass cards 270 millimetres in diameter, and with them I can make almost any size of compass card smaller than 270 millimetres on a photocopying machine. The height of the gnomon will be reduced proportionally.

It has been interesting to test various compass sizes. I have used them when adjusting compasses for fishermen and yachtsmen. For this purpose, I use a stick about 40 centimetres long. At the lower end there is a weight of about one kilogram of lead. At the upper end there is a circular platform on which I place the compass card with the gnomon at the centre. When one holds this with two fingers near the top, the stick is vertical and the platform is level, and it works well. When the point of the gnomon shadow is in the curve – in the mornings over the western half, and in the afternoons over the eastern half – the compass is true. It is even possible to use it to some extent near noon. Most navigators with whom I have discussed the idea have reacted very positively, but I met resistance from people who have no experience of navigation. I therefore decided to investigate the idea further, and in so doing I found support.

At the Viking Ship Museum in Roskilde, a research team is studying the building and sailing of copies of ships of the past. Two of the team, Max Vinner and Bent Andersen, are also interested in early navigation, so we began working together and have been doing so ever since.

The first person who really tested the gnomon compass was Max Vinner. The Norwegian Viking ship *Saga Siglar* was built as an exact copy of the Wreck No. 1 exhibited in the Viking Ship Museum. The Norwegian builders took all their measurements and information

on details from the wreck, and constructed a beautiful ship. After several tests and adjustments, the master, Ragnar Thorseth decided to circumnavigate the world with the ship, and planned to start the voyage in the summer of 1984 from near Bergen in Norway. He would call at the Shetland Islands, the Faroes, Iceland and then Greenland. Max Vinner was invited to join the vessel in Iceland and participate in the voyage from there to Greenland. We decided to construct some compasses for the latitudes from Iceland to Greenland and for the relevant dates, and not least of the same size as the find from Greenland. Max went off, and we received some extremely good reports from the "Vikings". The compasses had been tested every time the sun permitted. They were checked against the ship's magnetic compass, the deviation of which was negligible. The magnetic variation was known from the charts. The results were far better than the navigators had expected, and it was reported that even outside the relevant periods and latitudes they had been able to find their directions quite satisfactorily. I described the experiment in the book *Træk af Navigationens Historie, Bind I* (Extracts of the History of Navigation, Volume I) (Thirslund 1987).

At this time Aase Hansen joined the team. She is a dentist, but in her spare time she is an amateur archaeologist. During an excavation in a place called Albuen, a peninsula extending from the western part of the island of Lolland, she had been lucky enough to find a half-moon-shaped stone that at once reminded her of C. L. Vebæk's find from Greenland. It is a little larger, and both on the curved and on the flat side there are curves and lines undoubtedly carved for some purpose hitherto uncertain. She had heard of our team and approached us for our opinion. Assisted by Max Vinner and Bent Andersen she has made some progress. With the help of an apparatus made by Bent Andersen, it is possible to measure the height of the sun with the stone. The investigations go on, and Aase Hansen has drawn up a report on what has been found out so far (Hansen 1990). She was interested in our practical experiments and joined the team.

Aase Hansen's very carefully-taken colour slides of C. L. Vebæk's find have revealed evidence that the curve Dr. Curt Roslund interpreted as a gnomon curve was deliberately rendered visible by being traced out more than once with the tool. But the pictures revealed that the straight line above the curve had also been made more distinct by double tracing; and this means there are two specific gnomon lines on the find. The curved line could be from close to the summer solstice, and the straight line could be from the equinoxes. On the basis of these lines we have recalculated that for a latitude of about 61° north the gnomon would have been about 6 millimetres high.

The team now meets as often as new ideas need discussion. We carry on with practical experiments as often as possible, and a surprise came up in the spring of

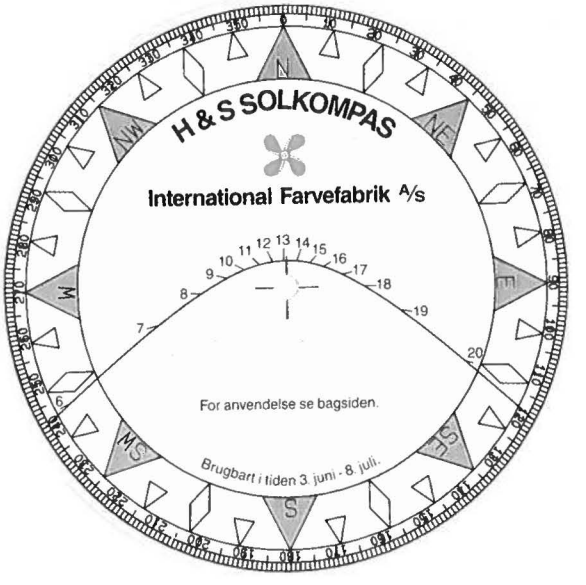


Fig. 101. A compass card like this was sent out to all yachtsmen taking part in the big races round the islands of Funen and Zealand.

1988. My former principals, *International Paints Ltd.*, had become interested in our experiments, and asked if it would be possible for us to make some sun compasses, which could be sent with the yachtsmen competing in the two great races round the islands of Funen and Zealand. This was a marvellous opportunity to find out how the idea would be received by yachtsmen, so we had 2000 compasses made of cardboard. They were 123 millimetres in diameter, and the curve for the summer solstice was printed on them. This curve is valid for the period from the 3rd of June until the 8th of July, during which the two races take place. To make the "instrument" attractive to the yachtsmen, we arranged to have it fitted on the top of a beer bottle, a thing within reach in almost any Danish yacht. A plastic capsule was supplied for placing on top of the beer bottle, with a hole in its centre where the base of the nine-millimetre gnomon would fit and lock the compass card in the proper position. The device was accompanied by a description and a reply card on which the yachtsmen were asked to give their opinion. We were fortunate enough to receive 116 positive replies and only two negative ones (Fig. 101).

Later that summer we were contacted by Mr. Jens Larsen from Nykøbing on the island of Falster. He and his mother were preparing an international jamboree for more than 600 boy scouts and girl guides. The jamboree was to be in "Viking style", and we were asked if we could supply a description so the young scouts would be able to make and use the sun compass, as I have described it in my book (1987). We sent the following brief instructions: "Give each scout a circular piece of wood seven centimetres in diameter and about one cen-

timetre thick. Have them knock a nail in the centre so that it sticks up about one centimetre. This will be the gnomon. Place the whole on a level surface in a place where the sun can shine on it throughout the day. Have them mark the end of the shadow of the gnomon at intervals of (for instance) every full hour. In the evening they should connect the marks with a curve. This will be the gnomon curve, and they should also place a mark where the curve is closest to the centre. Through this mark and the centre they should draw a straight line, and this line will be the north-south line, on the basis of which they can divide the compass into degrees or compass points as required. As long as the end of the sun's shadow is in line with the gnomon curve, the compass is true, and they can take bearings by sighting over the gnomon. If the marks are placed every full hour, they will also have a sundial".

The feedback was encouraging. Many of the young scouts had not only succeeded in making the compass, but also in determining the direction of a dike. It was very interesting to note that these young people, who had never worked with navigation before, could understand, make and use the sun compass.

In February 1989 we were contacted by C. L. Vebæk. He had received a letter from a researcher affiliated to the University of California. His name – Eric G. Jonsson – sounded suitably Scandinavian, and he was working on a paper on Viking navigation. Amongst his sources was Captain Sølver's *Vestervejen*, and he had also noticed the curve first seen by Curt Roslund. Mr. Jonsson wanted to know whether this curve had been noticed and interpreted before. He also wanted to know whether the curve appeared as just a scratch or seemed to have been made on purpose. Before answering the American, C. L. Vebæk wanted to know how far we had come with our tests, and a meeting was arranged at the National Museum.

The meeting was a very interesting one. For the first time Max Vinner, Bent Andersen and I had a chance to hold the disc in our hands, and we examined it with our magnifying glasses. We made a close study of the lines we had studied earlier on the slides taken by Aase Hansen, and we confirmed that both the curve and the straight lines had been rendered visible by more than one operation. As well as the disc, an old glass negative also emerged. This showed not only a picture of the disc, but also one of a full circular wooden disc, apparently of the same dimensions as the one described here. It bears no traces of compass-points or gnomon curves, but some concentric circles on it are at the same distances from the centre as they would have been if it had been intended to finish the object as a compass card similar to the one described. However, C. L. Vebæk believed this object was a disc used for playing games (Fig. 84), but later investigations of the disc seem to point in that direction that it may be looked upon as a half-produce of a sun dial, and Mr. Vebæk is now inclined to join this view.

At a later meeting at the National Museum we were permitted to borrow a real microscope, and with this we could see that the curve and the straight line had been made by cutting into the material at least two times. In the meantime an expert had examined the material and he stated that it is spruce or larch.

Most navigators with whom I have discussed Captain Sølver's interpretation have agreed that his idea could be the answer to the very old question of how the Norse navigators found their way over the North Atlantic. Curt Roslund's idea is a step forward, and, as demonstrated above, neither making nor using the gnomon compass requires much instruction or explanation – and the material is always within reach.

In the middle of the summer of 1989 I thought it worth the effort to study the exact wording of the criticisms of Captain Sølver's ideas, and I obtained the article from the Institute of Navigation. The critics' full titles were Emeritus Professor of Geography E. G. R. Taylor; Commander W. E. May, R. N. (National Maritime Museum) ; R. B. Motzo, Professor of Ancient History, University of Cagliari; and T. C. Lethbridge, Keeper of Anglo-Saxon Antiquities, University of Cambridge. To me it is not surprising that the only one favourable to Captain Sølver's idea was a man who had actually found his way over the oceans, Commander W. E. May.

None of the critics had the opportunity of holding the disc in their hands for closer examination. That might have inspired them to do some practical experiments with it. How they would have reacted to Curt Roslund's idea we do not know. They argued that the object was too small for practical navigation. My own view is that the Norse navigator kept his instrument a secret from his crew. It would be kept in a pocket and only taken out when he took his readings and put his vessel on the required course. "Projecting" the disc towards the bottom of the ship would make it appear up to 30 centimetres in diameter, and by doing so he would also be able to read his course against the keel. This was practiced by our testings.

Another argument against Sølver's idea was that the divisions are confusing in one quadrant. I agree, but in the trade where we can assume the disc was used, this meant nothing as long as the navigator himself knew which "point" showed the course.

Conclusion

The question of how the early navigators found their way over the North Atlantic has hitherto been answered with speculation:

- Did they go by instinct?
- Did they have any kind of magnetic compass?
- Were they able to observe their latitude?
- Did they have any kind of bearing dial?
- Were they guided by the presence of whales, fish and birds?

The question of whether they used a bearing dial was answered by Captain Sølver. In a rather more sophisticated way, we used instruments based on the same principle in my younger days, when we put a ship on a special course with a pelorus.

After several experiments we found that Dr. Roslund's idea was even better. Anyone can make the instrument, and using it presents no difficulty; even people unskilled in navigation can find their way with it as long as the sun is shining.

One might wonder why the small disc from Greenland is the only evidence that such a device was used, but considering that the material is wood, it would take very special conditions to preserve it for such a long time. C. L. Vebæk says that conditions at Ø 149 were excellent. Almost any navigation instrument from before 1600 was made of wood, and very few exist today. They have either rotted away or ended up in the fire.

Whatever instrument was used for observing latitude may also have been made of wood. If we ever find one we may be as surprised at its appearance as we are now at that of the sun compass. The known possibilities are the cross staff; measuring the length of the sun's shadow on the so-called *solskuggefjøl*; or the use of a stick of a given length held in the outstretched hand at a distance checked against a string with knots in it. But here we are back in the realm of speculation. The early writings give us only one fact to go by: the ancient navigator used the sun to guide him, and when the sun was hidden for some period of time he was *hafvilla*: he lost his way.

During my 25 years as a practical navigator I spent much of my spare time trying to find out how our ancestors found their way over the oceans, but the sources, especially in my own language, were very meagre. So I am very grateful that after my retirement I established close contacts with the Danish Maritime Museum at Kronborg Castle, and with the team mentioned above. The sources at the Museum have given me much of the information necessary to evaluate the positive and negative reactions to the two views on the use of C. L. Vebæk's find.

After various experiments with the reconstruction of the find, we are especially grateful to him for his endurance in the face of criticism. As Captain Carl V. Sølver said, the object is small, but we may add that the find is great. It has given us new approaches to solving the problem of how our ancestors found their way across the North Atlantic. May the future bring the right answer.

Addendum. In August 1990, after finishing this article, we were permitted to have the finds examined by the experts in the Danish Criminal Police Department. We delivered the halfmoon shaped and circular discs to the laboratorium, and we were permitted to have a close look at these objects in the microscope. One could immediately see that the summer curve and the straight line of the equinoxes were deliberately made visible by double tracing (cf. Fig. 99a). Together with the newly received radiocarbon datings (see section 10), we have found evidence, that the navigators of this early time could have had an instrument to guide them over the ocean.

9. The animal bones from Narsarsuaq

As in all other Norse settlements where archaeological excavations have been carried out, we also found a number of animal bones here at Narsarsuaq. The total number of finds of animal bones at Narsarsuaq was comparatively modest: only 610 bones or fragments of bones were found and registered. It must be added here, though, that for one thing the conditions for the preservation of bone material were generally relatively poor (except in a few places), and for another that in excavating we had no particular intention of finding animal bones: they were found more or less haphazardly, compared with our later excavations at Vatnahverfi and other parts of the Eastern and Middle Settlements. Of course I regret this today, but if excavations at Narsarsuaq are ever taken up again, I am sure the number of animal bones will be increased considerably – for example, with the bones of fish not represented in our material from 1945–46 and 1948. All the osseous material from Narsarsuaq has been studied by the American zoologist Thomas H. McGovern, who has incidentally dealt with almost all the zoological material from Norse Greenland, including my own finds from Narsarsuaq, Vatnahverfi, the Middle Settlement and the *landnáma* farm Ø 17a at Narsaq. McGovern (1979: 100–101) has given a short account of the finds from Ø 149, Narsarsuaq (the convent) and has also drawn up a complete list of the zoological finds from Narsarsuaq (McGovern 1985: 113). I take the liberty of reproducing McGovern's list in this paper.

Here and there in his many works on finds of animal bones from medieval Norse farms in Greenland, McGovern has also commented on the finds from Narsarsuaq. Among other things, he points out that a relatively high number of cows and caribous are represented in the material from Narsarsuaq.

Not being a zoologist myself I can of course add very little to what McGovern has written on finds of animal bones from Narsarsuaq. I might mention that it seems a little strange that there are no hare or pig bones, and that horses and dogs are only represented by one single bone from each species. Moreover, there are no fishbones at all. But as I have said, there undoubtedly are fishbones at the site: it is quite unbelievable that the Norsemen of this locality would not have fished. According to McGovern, there are five whale bones. I might add that we found rather a lot of baleen, all used as hoops for the seven large wooden barrels found in a

Ø 149 CONVENT McGovern 1979
Total Identified = 610 fragments

Species	TNB	% of whole	% of group
DOMESTICATES			
Bos taurus	100	16.37	50.00
Equus caballus	1	.16	.50
Canis familiaris	1	.16	.50
Ovis/Capra sp.	98	16.07	49.00
Total Domesticates	200	32.79	
CARIBOU			
Rangifer tarandus	23	3.77	
PHOCIDAE			
Pagophilus groenlandicus	34	5.57	39.53
Phoca vitulina	10	1.64	11.63
Phoca hispida	2	.33	2.33
Erignathus barbatus	5	.88	5.81
Cystophora cristata	35	5.74	40.70
Phocid sp.	287	47.05	
Total Phocid	373	61.15	
CETACEA			
Large Whale	1	.16	
Whale sp.	4	.66	
Total Cetacean	5	.82	
AVES			
Uria sp.	2	.33	
Somateria spectabilis	1	.16	
Total Aves	3	.49	
OTHER			
Homo sapiens	1	.16	
Odobenus rosmarus	1	.16	
Ursus maritimus	4	.66	

NOTES: Collections unsieved, pH unknown, conditions of organic preservation good

room or house from the oldest period of Norse settlement at Narsarsuaq. The reason McGovern has not mentioned the baleen material (to my knowledge the largest amount discovered so far in the medieval Norse settlements in Greenland) may simply be that it was not sent to the Zoological Museum, so he could have no knowledge of it. As mentioned elsewhere in this paper, it seems possible to prove that there were at least two periods of Norse settlement at Narsarsuaq: a very early one (perhaps during the *landnáma* period), and a later one associated with the Benedictine convent. Nearly all the animal bones belong to the oldest phase of settlement at Narsarsuaq, and most of them are found in one single building (2-IV) where the conditions for the preservation of organic material were best. Generally, and especially in the period when the Benedictine convent existed, the conditions were not optimal, as proved by the graves in the church and churchyard.

10. Remarks on some difficult problems connected with the periods of Norse habitation at Narsarsuaq

In the description of the church and the churchyard, and in connection with the interesting construction designated 2-IV, I have said that there were undoubtedly two building periods here in medieval Norse times: an older one, appearing as a cultural stratum of varying thickness, and with definite traces of an early stage of Building 2-IV (the seven large barrels in 2-IV undoubtedly date from this stage), and a more recent one when the church and churchyard, and most (perhaps all) of the other ruins registered at the site were built. Unfortunately I found no hard evidence of the interval in time between the older settlement and the period when the convent existed here. However, in 1948 I made some geological and archaeological observations at the site, and (with a few corrections) I will here reproduce these observations from my notebook.

As early as 1946 we noticed alterations in layers of sand, gravel and black earth under some ruins. At first I regarded the sand and gravel as material washed out from the terrain behind and from the mountain slopes, and the black stripes as the result of different periods of natural vegetation. By the time of the 1948 investigations, though, we were able at several points to observe with certainty that at least one of the black deposits was from an earlier settlement at the site. During the excavation of the large Room 2-III, up to about 3.7 metres from the south wall and 12.5–13 metres from the east end, we found a layer of sterile greyish-yellow gravel, up to 0.2 metres thick, with a slight inclination, corresponding to that of the house, from north to south. This layer disappeared under the wall at the south side and could be followed with certainty all the way out into the meadow, about 25 metres off. At other points where this layer, and other sand and gravel deposits, were observable, they all went under the walls, so that the foundation stones lay either on or slightly embedded in these layers. Under the gravel we observed a dense black layer of earth, a little moist, about 0.16–0.17 metres thick. This layer contained a lot of wood, especially small sticks, but there were also many definite wooden chips, some of them with clear traces of cutting. An area of 1.5 × 1.5 metres of this layer was uncovered and systematically excavated to the bottom – a grey, compact gravel subsoil. This excavation turned up (besides a number of wooden chips bearing traces of cutting) a few animal bones (one of them flaked), and a game counter of walrus tusk (or perhaps whalebone). So the character of the layer as a culture deposit is certain, and it was hereby proven that there had been a Norse settlement at Narsarsuaq before the one whose house ruins are now visible, which was undoubtedly

Fig. 102. Fragment of a rope, made of juniper withies. (Max. diam. ca. 40 cm).

connected with the convent. (Yet it must be recalled that the oldest part of 2-IV presents certain problems). The heavy deposit of gravel or sand seems – with some degree of certainty – to be evidence of a single natural disaster that destroyed the original settlement. Presumably the spot was settled as early as the *landnáma* period, and this was the settlement that was laid waste. Later (we do not known when, but presumably in the twelfth century) the convent was established.

Another of the houses, 2-IV, exhibited similar features, but the situation was more complex. At the south side of this house, near the SE corner, a section about one metre high and 1.5 metres wide was visible. Under about 1.55 metres of wall (decomposed turf with a few stones) there followed 0.10–0.20 metres of greyish-yellow gravel, undoubtedly the same horizon as found in 2-III. Under the gravel was a streak of charcoal, 0.03–0.06 metres thick, and under this again was a layer reminiscent of eroded turf (containing much sand) 0.10–0.30 metres thick. Beneath all this was the subsoil of grey gravel containing some large stones. Some photographs and samples were taken here. It should be noted that the objects and animal bones found in 2-III were nearly all lying above the gravel – at least (as far as I know) all the objects of steatite; but regrettably I was not at first aware of the special stratigraphical problems, so finds were not kept separate, and when the conditions became evident, everything above floor level had been dug away. So nothing certain can be said about the finds in 2-III. In the eastern part of the room, where there was no gravel, the upper and lower cultural strata merged without any separation.

Radiocarbon datings undertaken of two objects found in the lower (*i.e.* oldest) culture layers of House 2 (Room IV) bring back the first Norse settlement of Narsarsuaq to the *landnáma* period, *viz.* K-5572 (spindle of fir (nr. 16), drift-wood?), 985 A.D. (calibrated and corrected), 895–1010 A. D. (± 1 stand.dev.), and K-5573 (fragment of a rope made of twisted withies of local juniper (nr. 176, Fig. 102)), 1025 A. D. (calibrated and corrected), 1010–1150 A. D. (± 1 stand. dev.).

The conditions at the site are of considerable geological and archaeological importance for the assessment of the settlement as a whole, and supplementary investigations should be made here whenever possible.

11. Summary of the results of the study of the church topography of the Eastern Settlement, and of the archaeological investigations at Narsarsuaq in 1945–46 and 1948

To conclude this paper it seems reasonable to give a very brief summary of the results of the studies and investigations described in the two parts of this work.

I undertook in Part I to revise our knowledge of the church topography of the Eastern Settlement. My aim here was to give an updated version of all we know from the study of this aspect of medieval Norse settlement in Greenland. I have shown where we know that churches existed, and which of them we can identify with the names known from the written sources. I have further indicated places where one might search for the parish churches still unlocated. A few pages of Part I deal with the interesting (and apparently still growing) group of quite small churches whose names we do not know, and which I assume were not parish churches, but local farm chapels. Special mention was made of Uunartoq Fjord, where I tried (successfully, I hope) to locate Vagar Church and the Benedictine convent.

Part II is an account of the investigations at Narsarsuaq, at the presumed Benedictine convent. It presents the results of the excavation of the church and part of the churchyard, and of the excavation of some of the other ruins at the site, especially a very large ruin complex found to consist of several separate houses, one of which was of special interest, as traces of seven large barrels were found in the ground inside it. I proved that there were at least two periods of settlement at Narsarsuaq, and that the oldest (with the seven barrels) was presumably from an early stage of Norse settlement in Greenland – the *landnáma* period – but that this older settlement disappeared at some point, almost certainly destroyed by a natural catastrophe. Later, perhaps in the twelfth century, the Benedictine convent was established. Perhaps all the ruins now visible at Narsarsuaq were associated with the convent. The many finds of various kinds of objects are presented, and the finds of animal bones are mentioned.

12. Final remarks

It is with a feeling of some satisfaction – or perhaps I should say relief – that I finish this paper. I am glad I have managed to bring all this to a conclusion; but I certainly do not consider the results quite satisfactory. There are too many lacunae in the material presented here, and too many problems that cannot be said to have been solved satisfactorily. The difficult question of the first Norse settlement at Narsarsuaq, and how and when it came to an end, has not been definitively solved. Looking back today, I can see that we should have removed the northern wall of 2-IV in the hope of finding the original north wall of this house from the first settlement here, and that we should have excavated all the barrels completely. This is work for younger archaeologists. Likewise, a better, more complete excavation of the churchyard is necessary, and perhaps an attempt should be made to excavate the eastern part of the long Ruin Complex 2, as well as some of the other ruins we did not excavate exhaustively, or not at all. In short, a revision of my excavations at Narsarsuaq is necessary. I wish my successors good luck!

13. Summary of objects found during the excavations at Narsarsuaq (the Benedictine convent), Ø 149, during the excavations in 1945–46 and 1948

(A considerable number of the finds have been photographed, but only some of the pictures have been published in this book. In the list of objects there is a reference to each illustration. The total find is registered in the Danish National Museum as D-1-1991.)

Number	Finding-place	Object
1.	The churchyard	Fragment of a church bell of bronze.
2.	The churchyard	Fragment of the tongue (?) of a church bell.
3. (Fig. 85)	House 2, Room III	Game counter (chessman?) of wood.
4.	House 2, Room III	Game counter (fragment of tooth).
5. (Fig. 84)	House 2, Room III	A circular disc of spruce or juniper with incised circles – perhaps a half-produce of a sun-dial.
6. (Fig. 81)	The churchyard	Closing device for a garment, consisting of many small links of iron (and a few of bronze).
7.	House 2, Room IV	Hairpin of wood, decorated.
8.	House 2, Room IV	Spherical bead of white glass.
9.	Between Houses 1 and 2a	Small fragment of a comb of bone.
10.	Outside House 9	Small bead of blue glass.
11.	The churchyard, Grave Field I-8	Fragment of a garment of woollen cloth.
12.	The churchyard Grave Field I-12	Fragment of woollen cloth.
13. (This number does not seem to have been used.)		
14.	House 2, Room IV	Fragment of woollen cloth.
15.	House 2, Room IV	Fragment of woollen cloth.
16.	House 2, Room IV	Spindle of wood, fragm.
17.	House 2, Room IV	Spindle of wood, fragm.
18.	House 2, Room IV	Thread reel of wood.
19.	Outside the east end of Room III	Spindle-whorl of steatite
20.	House 9, Room I	Spindle-whorl of steatite.
21.	House 9, Room I	Spindle-whorl of steatite.
22.	House 11, Room d	Spindle-whorl of steatite.
23.	House 2, outside the north wall of Room III	Weight-stone (for loom) of steatite.
24.	House 2, Room III	Weight-stone of steatite.
25.	House 2, Room III	4 weight-stones of steatite.
26.	Scattered finds	11 weight-stones of steatite.
27. (Fig. 95)	House 2, Room IV	Spoon of wood, fragm. with runic inscriptions.
28.	House 2, Room IV	A handle to a small spoon of wood.
29. (Fig. 82)	House 2, Room IV	Ladle of wood.
30. (Fig. 83)	House 2, Room IV	Scoop of wood.
31.	House 2, Room III	Eating-board of wood.
32.	House 2, Room IV	Fragment of wooden bowl.
33. (Fig. 86)	House 2, Room IV	Large fragment of the bottom of a wooden barrel (Barrel 1).
34. (Fig. 86)	House 2, Room IV	Cross-beam from the bottom of a barrel (Barrel 2?) with a fragment of the bottom nailed to it with a separate piece of wood.
35.	House 2, Room IV	Plank from the bottom of a wooden barrel (No. 2?), complete.
36.	House 2, Room IV	22 fragments of barrel staves (from Barrel 4), partly glued together.
37. (Fig. 96)	House 2, Room IV	Fragment – the lower part – of a barrel stave, with a runic inscription (from Barrel 4).
38.	House 2, Room IV	2 fragments of the same bottom (from Barrel 4).
39.	House 2, Room IV	Fragment of a wooden barrel bottom found in Barrel 4 (but unlikely to belong to this barrel).
40.	House 2, Room IV	5 partly-assembled fragments of barrel staves (which barrel uncertain).
41.	House 2, Room IV	Fragment of a barrel stave, the lower part, found in Barrel 6 and probably belonging to it.
42.	House 2, Room IV	Heavy bottom plank, with one wooden nail, from a large barrel.
43.	House 2, Room IV	Fragment of the bottom of a large barrel, diameter 110–115 cm, with two nail holes.
44.	House 2, Room IV	Barrel stave, almost complete, from a large barrel, about 0.80 metres long.
45.	House 2, Room IV	3 fragments of broad barrel staves, lower part, from a large barrel.

Number	Finding-place	Object
46.	House 2, Room IV	3 fragments of barrel staves, from a large barrel. One of the fragments is from the upper part of the barrel, the others from the lower.
47.	House 2, Room IV	Double iron nail, with a little baleen preserved, and a fragment of baleen with a hole for a nail – all parts of hoops for large barrels.
48.	House 2, Room IV	Wooden bung for a large barrel.
49.	House 2, Room IV	Two longish wooden nails for large barrels.
50.	House 2, Room IV	5 partly-fragmented short wooden nails or bungs for large barrels.
51.	House 2, Room IV	Wooden nail, most probably for a smaller barrel.
52.	House 2, Room IV	Flat wooden plug, most probably for a barrel.
53.	House 2, Room IV	Fragment of a bottom plank, with 4 nail holes, and 2 wooden nails preserved, from a smaller barrel.
54.	House 2, Room IV	Bottom for a barrel, cut out from one piece of wood, for a smallish vessel (diameter 17–18 cm.)
55.	House 2, Room IV	Fragment of the bottom of a barrel, the middle part, ornamented on both sides with concentric circles.
56.	House 2, Room IV	Fragment of the bottom of a barrel, the middle piece.
57.	House 2, Room IV	Fragment of the bottom of a barrel, the middle piece, with wooden nails preserved in each side.
58.	House 2, Room IV	Fragment of the bottom of a barrel, with two large nail holes, in one of which a nail or plug is preserved.
59.	House 2, Room IV	Fragment of the bottom of a wooden barrel, from the edge, with 3 holes for assembly, in which there are remains of wooden nails.
60. (Fig. 87)	House 2, Room IV	Fragment of the bottom of a wooden barrel, about half, with ornamentation consisting of concentric circles on both sides.
61.	House 2, Room IV	Fragment of the bottom of a wooden barrel, the edge, with 3 holes for assembly, in which there are remains of wooden nails.
62.	House 2, Room IV	Fragment of the bottom (?) of a barrel, cut out from one piece, ornamented with concentric cirles.
63.	House 2, Room IV	4 fragments of 4 different wooden barrel bottoms.
64. (Fig. 87)	Found on the surface	(?) Fragment of wooden lid of a vessel. Part of the edge, with a square notch, 2 perforations and 2 connection holes in the edge.
65.	House 2, Room IV	Barrel stave, from a small barrel. Found in Barrel 4.
66.	House 2, Room IV	Barrel stave, from a small barrel, found in Barrel 6.
67.	House 2, Room IV	Two barrel staves belonging to the same small barrel.
68.	House 2, Room IV	As 67.
69.	House 2, Room IV	Two barrel staves, apparently belonging to the same small barrel.
70.	House 2, Room IV	Two barrel staves from different barrels.
71. (Fig. 87)	House 2, Room IV	Five barrel staves from different barrels (one shown in the picture).
72.	House 2, Room IV	Barrel stave for a fairly small barrel.
73. (Fig. 87)	House 2, Room IV	Four barrel staves from different fairly small barrels or vessels (two of them shown in the picture).
74. (Fig. 87)	House 2, Room IV	Two barrel staves from the same barrel (one shown in the picture).
75.	House 2, Room IV	Four barrel staves from different small barrels.
76.	The churchyard	Two small fragments – rimsherds – of the same vessel of steatite, ornamented.
77.	The churchyard	Fragment of a vessel (a lamp?) of steatite.
78.	House 2, Room I	Fragment of a vessel of steatite.
79.	House 2, Room I	Fragment of a vessel of steatite.
80.	House 2, Room I	Fragment of a vessel of steatite, with one perforation.
81.	House 2, Room I	As No. 80, with some scratching.
82.	House 2, Room II	Small fragment of a vessel of steatite.
83.	House 2, Room III	Small fragment of a vessel of steatite.
84.	House 2, Room III	Small fragment of a vessel of steatite, a rimsherd, with ornamentation just under the rim, consisting of a number of slightly scratched lines, forming a distinctive pattern.
85.	House 2, Room III	Fragment of a vessel of steatite.
86.	House 2, Room III	Two small fragments of different vessels of steatite, rimsherds, with ornamentation on the rim, consisting of concentric circles.
87.	House 2, Room III	Two largish fragments of two different vessels of steatite. Heavy material. One of the pieces has a perforation.
88.	House 2, Room III	Small fragment (rimsherd) of a vessel of steatite.
89.	House 2, Room III	Small fragment of a very shallow vessel of steatite (a pan?).
90.	House 2, Room III	Fragment (a corner) of a vessel of steatite.
91.	House 2, Room III	The same, heavy material, with one perforation. Inside as well as outside a crust of soot.
92.	House 2, Room III	Large fragment of a vessel of steatite, with rounded knob. One large perforation.
93.	House 2, Room III	The same, bored through the handle.

Number	Finding-place	Object
94.	House 2, Room III	Fragment (rimsherd) of a vessel of steatite. With a rounded knob and one perforation.
95.	House 2, Room III	Two fragments of vessels of steatite, rather heavy material, one of them with a largish perforation and traces of another: a scratched cross may be an owner's mark.
96.	House 2, Room III	Largish fragment of a vessel of steatite, a sidesherd, with one perforation and a cross (owner's mark?)
97.	House 2, Room III	Six fragments of vessels of steatite, four of them with perforations, and one with a fragment of an iron nail.
98.	House 2, Room III	Small fragment of the handle of a vessel of steatite.
99.	East of House 2, Room III	Fragment of a vessel of steatite (rimsherd) ornamented along the edge with a groove.
100.	House 2, Room III	Two smaller fragments of a vessel of steatite, rimsherds.
101.	House 2, Room III	Small fragment of a vessel of steatite with a flat knob.
102.	House 2, Room IV	Largish fragment of a vessel of steatite, a rimsherd, with one perforation. Found in Barrel 4.
103.	House 2, Room IV	Largish fragment of a vessel of steatite. Heavy material. With one perforation and traces of another, in which part of an iron nail. Found in Barrel 4.
104.	House 2, Room IV	Largish fragment of a vessel of steatite, very curved sidesherd. Heavy material, with one perforation, and traces of another, in which a fragment of an iron nail.
105.	House 2, Room IV	Fragment of a vessel of steatite, with two perforations and traces of two others. Found in Barrel 4.
106.	House 2, Room IV	Smallish fragment of a vessel of steatite with one large perforation. Found in Barrel 4.
107.	House 2, Room IV	Largish fragment of a vessel of steatite, part of the side, with the rim, which is ornamented. The vessel is furnished with a flat handle.
108.	House 2, Room IV	Another fragment of the same vessel as No. 107 (the two fragments have been joined together).
109.	House 2, Room IV	Fragment of a vessel of steatite, a rimsherd, ornamented with concentric circles.
110.	House 2, Room IV	Fragment of a vessel of steatite, a rimsherd, with ornamentation consisting of concentric circles on the rim as well on the sides.
111.	House 2, Room IV	Large fragment of a vessel of steatite, part of rim and side, very heavy material.
112.	House 2, Room IV	Fragment of a vessel of steatite, part of the bottom and one side. With one perforation.
113.	House 2, Room IV	Small fragment of a vessel of steatite, a rimsherd.
114.	House 2, Room IV	Six small fragments of a vessel of steatite, very thin material.
115.	House 2, Room IV	Largish fragment of a vessel of steatite, sidesherd, heavy material, with a thick crust from burning on the inner side.
116.	House 2, Room IV	Two fragments of vessels of steatite, each with one perforation, one of them also with a cross (owner's mark?).
117.	House 2, Room IV	Small fragment (rim plus bottom) of a very shallow vessel of steatite, heavy material.
118.	House 2, Room IV	Fragment of a vessel of steatite, the bottom and a little of the side, rather thin material.
119.	House 2, Room IV	Fragment of a vessel of steatite, a handle (?), rather heavy material.
120.	House 2, Room IV	Patch of steatite for repairing a vessel, with four iron nails preserved.
121.	House 2, finds from the surface	Largish fragment of a vessel of steatite, quite shallow, with a very heavy rim.
122.	House 2, finds from the surface	Fragment of a vessel of steatite. A corner sherd.
123.	House 2, finds from the surface	Fragment of a vessel of steatite, part of the rim, with concentric lines on the rather narrow rim. One perforation.
124.	House 2, finds from the surface	Fragment of a vessel of steatite, a rimsherd. Ornamented with deep, parallel lines on and under the rim.
125.	House 2, finds from the surface	Fragment of a vessel of steatite (rimsherd) with two concentric cirles on the rim.
126.	House 2, finds from the surface	Small fragment of a vessel of steatite, with two parallel lines under the rim.
127.	House 2, finds from the surface	Small fragment of a vessel of steatite (rimsherd), with two concentric circles on the rim.
128.	House 2, finds from the surface	Small fragment of a vessel of steatite, a rimsherd, rather thin material, with one scratched line in the rim.
129.	House 2, finds from the surface	Fragment of a vessel of steatite, a rimsherd, rather burnt.

Number	Finding-place	Object
130.	House 2, finds from the surface	Small fragment of a vessel of steatite, rather thin material.
131.	House 2, finds from the surface	Three smallish fragments of different vessels of steatite, rather heavy material.
132.	House 2, finds from the surface	Small fragment of a vessel of steatite, with cross-like marks on both sides (owner's marks?).
133.	House 2, finds from the surface	Small fragment of a vessel of steatite, rather thin material, with one perforation, filled in with a plug of steatite.
134.	House 9, entrance	Large, faceted handle of a vessel or pan of steatite. With an owner's mark (?).
135.	House 9, Room I	Large fragment of a vessel of steatite, rim plus side, very heavy material.
136.	House 9, Room I	Smallish fragment of a vessel of steatite (rimsherd) with broad beading between rim and side.
137.	House 9, Room I	Fragment of a vessel of steatite, rather heavy material, with one perforation, and an owner's mark (?).
138.	House 9, Room I	Fragment of a vessel of steatite, rather heavy material, with one perforation and some scratches, presumed to be owner's mark.
139.	House 9, outside the house	Flat handle (?) of a vessel of steatite, with a square depression in one side.
140.	House 9, outside the house	Small fragment of a vessel of steatite (rimsherd), thin material, with two concentric circles on the rim and two under it.
141.	House 11b	Fragment of a vessel of steatite, side plus rim, thin material.
142.	House 11c	Large fragment of a vessel of steatite, sidesherd, very heavy material, with two perforations.
143.	House 11c	Fragment of a vessel of steatite (rimsherd) heavy material (probably part of the same vessel as No. 142).
144.	House 11c	Fragment of a vessel of steatite (rimsherd).
145.	House 2, Room IV	Iron knife, fragmented with a small part of the wooden hilt left.
146.	House 2, Room IV	Wooden hilt for a knife (of iron).
147.	House 2, Room IV	Presumed handle, of wood, with two large perforations. Exact function unknown.
148.	House 2, Room IV	An object similar to No. 147, but with only one perforation, and not as well preserved.
149.	Outside House 9	Implement of wood, of horseshoe-like form, with 2 "knobs" at both ends. Use unknown.
150.	House 2, Room IV	Tethering peg of wood.
151.	House 2, Room IV	Wedge of wood.
152.	House 2, Room III	Spade of whalebone, fragmented, with four nail holes.
153. (Fig. 92)	House 2, Room IV	Needle of bone, with an eye, in which a fragment of twisted woollen thread.
154. (Fig. 92)	House 2, Room IV	Needle of bone, similar to No. 153.
155.	House 2, Room IV	Fragment (pointed end) of a needle of bone, apparently like Nos. 153–54.
156.	Churchyard	Fragment of a whetstone (Igaliku sandstone).
157.	House 2, Room II	Three small fragments of different whetstones, two in fine grey quartzite, one of a coarser grey quartzite.
158.	House 2, Room III	Two small fragments of different whetstones, one in red porphyrite, the other in grey quartzite.
159.	House 2, outside the west wall of III	Largish fragment of a heavier whetstone of greyish-black, dense quartzite?
160.	House 2, Room IV	Small fragment of a whetstone of grey quartzite (found in Barrel 4).
161.	House 2, Room IV	Two fragments of whetstones, one larger in heavy greyish-black quartzite, one smaller in greyish quartzite.
162.	House 2, the surface	Largish fragment of a whetstone, in Igaliku sandstone, with one groove.
163.	House 2, the surface	Two small fragments of whetstones, in red porphyrite.
164.	House 2, the surface	Two whetstones of grey quartzite.
165.	House 2, the surface	Fragment of a broad whetstone in Igaliku sandstone.
166.	House 9, outside the House	Fragment of a whetstone in grey quartzite.
167.(Fig. 90)	House 2, Room IV	Two fragments of a complex wooden object consisting of 2 × 2 deliberately cut willow sticks lashed together with withies – undoubtedly part of one large piece. Exact use unknown, but it may very well be a hoop for one of the seven big barrels.
168.	House 2, Room II	Iron nail, short.
169.	House 2, the surface	Two heads of iron nails.
170. (Figs. 88–89)	House 2, Room III	Two largish fragments of a board wich fit together, with incised decoration on both sides. Perhaps part of a panel (or an item of furniture).
171.	House 2, Room IV	Fragment of a largish, specially cut wooden board. Apparently part of a panel (or an item of furniture).

Number	Finding-place	Object
172.	House 2, Room IV	Three long wooden nails (?).
173.	House 2, the surface	Iron slag.
174. (Fig. 99)	House 2, Room III	Fragment (about half) of a disc of spruce or larch wood, presumed to be a unique form of compass (described in detail in section 8b).
175. (Figs. 97–98)	House 2, Room III	Thin chip of wood, pointed at each end. On both sides very distinctly carved runic inscriptions (described in detail in section 8a).
176. (Fig. 102)	House 2, Room IV	One large and two small fragments of twisted rope. The material is juniper.
177.	House 2, Room III	Largish fragment of an object of whalebone, with two perforations. The exact function of this object is unknown. (Eskimo origin?).
178.	House 2, surface	Smallish fragment of an object of whalebone, with one perforation. Use unknown. Of Eskimo origin?
179.	House 2, outside the east end of III	A sinker for a fishing net, made of very hard stone, slightly oviform. Round the whole length of the object a broad groove has been cut.
180.	House 2, Room III	Small fragment of a flat, thin, oblong piece of bronze, with a square perforation near one end. Use unknown.
181.	House 2, Room III	Fragment of angular, flat, broad iron object. Use unknown.
182.	House 2, surface	Oblong, very well-preserved tool of some kind, made of iron. It is the best preserved piece of iron from the locality, and certainly has nothing to do either with the Norsemen or the (later) Eskimos. Perhaps a carpenter's tool of some kind, but its exact use is unknown to the author. Its date is undoubtedly "colonial", 18th-19th century.
183.	House 9, midden	Fragment of a small stick with a square section, and pyramidal tapering at each end.
184.	House 9, midden	Long, thin, pointed stick.
185.	House 2, Room III	Two small fragments of cut sticks, one with a round section, the other a little more flat and pointed.
186.	House 2, Room IV	Large and small fragments of 8 more or less round, thin, pointed sticks.
187.	House 2, Room IV	Fragment of a flat, pointed stick – rounded, curved and bevelled.
188.	House 2, Room IV	Stick (or peg) of wood, a fragment.
189.	House 2, Room IV	Smallish wedge-shaped stick (peg) of wood, fragmentary.
190.	House 2, Room IV	Fragment of a stick, approximately square section. One end has been cut flat. Found in Barrel 4.
191.	House 2, Room IV	Fragment of a flat stick (peg) of wood, with ornamentation on both sides, consisting of lightly incised criss-cross lines.
192.	House 2, Room IV	A very long, heavy wooden stick, with a circular section. At one end a knob has been cut. The piece seems to be complete (length about 0.88 metres). Use unknown.
193.	House 2, Room IV	Flat, thin wooden stave (?). The piece seems to be complete. The object (the use of which is unknown) is ornamented on one side, with flat, carved figures and scratched lines.
194.	House 2, Room IV	Cross-like wooden object.
195.	House 2, Room IV	Fragment of a flat, square piece of wood, tapering towards one end, fragmentary at the other. One perforation near the preserved end.
196.	House 2, Room IV	Fragment of wood, oblong, with one perforation just where the object is broken. Found in Barrel 6.
197.	House 2, Room IV	Flat stick (peg) of wood, slightly concave at one end, fragmentary at the other.
198.	House 2, Room IV	Short, rather heavy piece of wood. The broad sides and one of the ends have concave cutouts.
199.	House 2, Room IV	Heavy, rather short, square piece of wood. Obliquely cut off at both ends.
200.	House 2, Room IV	Thin, short, square piece of wood of the same character as No. 199, with the ends cut similarly.
201.	House 2, Room IV	Flat piece of wood, slightly curved (on the narrow side), cut slightly obliquely at the ends. On one side a quite deep cutout.
202.	House 2, Room IV	Fragment of a rather heavy piece of wood.
203.	House 2, Room IV	Fragment of a flat, thin piece of wood with two incised lines, one on each side.
204.	House 2, Room IV	Small fragment of a flat peg (stick) of wood.
205.	House 2, Room IV	Long, flat, thin stick, with a notch near one end.
206.	House 2, Room IV	Long, flat, thin stick, cut to a point at one end.
207.	House 2, Room IV	Fragment of a wooden stave, long and narrow, from a large barrel. A notch has been cut around the piece in continuation of the original deep groove for the barrel bottom.
208.	House 2, Room IV	Wooden staff with a square section and a concave cut at one end.
209.	House 2, Room III	A pick (?) made of walrus tusk.

Number	Finding-place	Object
210. (Fig. 93)	House 2, Room IV	A "dragon" (fabulous animal) (???). A very strange object, difficult to describe. It is apparently made of a cow's horn and consists of (at least) two parts joined by a number of tiny nails of bronze. The object was found in several pieces, but it was partly possible to join them. One end of the object is a little thicker and shows the head (?) of an animal. There seems to be no parallel to this strange object.
211. (Fig. 94)	House 2, Room IV	Fishing implement of whalebone designed for fishing for sea scorpions. The only implement found at Narsarsuaq that is undoubtedly of Eskimo origin. It may be from the period when the Norsemen lived here (see further description in Section 8).
212.	House 2, Room I	A roughly circular disc of steatite, rather heavy at the edge, with a perforation approximately in the middle. The piece is ornamented on both sides with fairly deeply-incised circles and grooves. Perhaps originally a fragment of a vessel, later changed to the form described. May have been used as a loom weight.
213.	House 2, Room I	Fragment of a slab (?) of steatite, very heavy material, possibly a fragment of a vessel.
214.	House 2, the wall between II and III	Unusual object of steatite. It is a "whirl-formed" piece, cut, with two perforations (no clear identification).
215.	House 2, Room III	Fragment of a square plate of steatite, with an incised cross.
216.	House 2, surface	A short pipe of steatite.
217.	House 2, surface	A small, almost shuttle-shaped piece of steatite.
218.	House 9, Room I	A piece of steatite, of natural shape, but smoothed on the surface, with one perforation and two just begun, and the traces of one more. Cut off. Most likely a weight for the loom.
219. (Fig. 91)	Exact finding-place unknown	Fragment of a beaker (?) of birchwood. Estimated height about 7.7 cm. No bottom. Outside diameter about 6.6 cm. Above, a kind of beading, very flat, all the way round, only 5–6 mm broad. Similar beading about 4 cm below. The thickness of the wood varies from just 1–2 mm to 6 mm.

References

Albrethsen, S. E. 1972. Nordbonyt – *Skalk*, 4: 11–15.

Andersen, E. L. 1982. De norrøne stednavne i Østerbygden. – *Grønland* 5–7:163–176.

Bardarson, I. 1930. *Det gamle Grønlands Beskrivelse* , F. Jonsson (ed.). – Levin & Munksgaard, København: 75 pp.

Bruun, D. 1895. Arkæologiske Undersøgelser i Julianehaab Distrikt. – *Meddr Grønland* 16: 171–461.

Clemmensen, M. 1911. Undersøgelsesrejse i Sommeren 1910, Kirkeruiner m.m. i Julianehaabs Distrikt. – *Meddr Grønland* 47:283–358.

Granlund, J. 1970. Sked. – *Kulturhistorisk Leksikon for Nordisk Middelalder* XV:451–458. – Rosenkilde & Bagger, København.

Grönlands Historiske Mindesmærker, I-III. 1838–1845. Udgivne af Det Kongelige Nordiske Oldskrifts-Selskab. – Det Brünnichske Bogtrykkeri (I-II) & S. L. Möllers Bogtrykkeri (III), Kjøbenhavn: 797, 791 & 950 pp.

Hansen, Aa. 1990. Kurs mod sildemarkedspladsen. Beskrivelse af et sandsynligt middelalderligt navigationsinstrument fra Albuen, Lolland. – *Maritim Kontakt* 14: 21–54.

Jansson, S. B. F. 1981. Gästriklands runinskrifter. – *Sveriges runinskrifter*, 15(1). – Royal Academy of Letters, History and Antiquity, Stockholm: 228 pp.

Jonsson, F. 1898. Grønlands gamle Topografi efter Kilderne. – *Meddr Grønland* 20: 265–329.

– 1930. *Det gamle Grønlands Beskrivelse af Ívar Bárðarson*, udgiven efter Håndskrifterne af Finnur Jónsson. – Levin & Munksgaard, København: 75 pp.

Krogh, K. J. 1965. Thjodhildes kirke på Brattahlid. – *Nationalmuseets Arbejdsmark* 1963–1965:5–18.

– 1976. Om Grønlands middelalderlige kirkebygninger. – *Minjar og Menntir. Festskrift til Kristian Eldjarn*, 1976, pp. 294–310. – Reykjavik: 576 pp.

– 1982. *Erik den Rødes Grønland*, (org. 1967). – Nationalmuseets Forlag, København: 266 pp.

Liestøl, A. 1979. Andres gjorde meg. – *Universitetets Oldsaksamling 150 år. Jubileumsårbok* 1979:228–234. Oslo.

McGovern, Th. H. 1979. The paleoeconomy of Norse Greenland. – Unpublished Ph.D.Thesis. Columbia University.

– 1985. Contributions to the paleoeconomy of Norse Greenland. – *Acta Archaeologica* 54:73–122.

Nørlund, P. 1924. Buried Norsemen at Herjolfsnes. – *Meddr Grønland* 67:1–270.

– 1929. Norse Ruins at Gardar. – *Meddr Grønland* 76(1): 1–170.

Nørlund, P. & Stenberger, M. 1934. Brattahlid. – *Meddr Grønland* 88(1):1–161.

Ramskou, T. 1982. *Solkompasset*. – Rhodos, København: 68 pp.

Roslund, C. 1985. Hur hittade Vikingerna till Vinland? – *Forskning och Framsteg* 5:4–11.

Roussell, Aa. 1936. Sandnes and the Neighbouring farms. – *Meddr Grønland* 88(2):1–219.

– 1941. Farms and Churches in the Medieval Norse Settlements in Greenland. – *Meddr Grønland* 89(1):1–355.

Stigum, H. 1956. Ask. – *Kulturhistorisk Leksikon for Nordisk Middelalder* I:269. – Rosenkilde & Bagger, København.

Sølver, C. V. 1953. The discovery of an ancient bearing dial. – *Journal of the Institute of Navigation* 6:294–296.

– 1954. *Vestervejen. Om Vikingernes Sejlads*. Summary in English. – Iver C. Weilbach & Co., Copenhagen: 136 pp.

Taylor, E. G. R., May, W. E., Lethbridge, T. C. & Motzo, R. B. 1954. A Norse Bearing Dial? – *Journal of the Institute of Navigation* 7: 78–84.

Thirslund, S. 1987. *Træk af Navigationens Historie*, I. – Handels- og Søfartsmuseet, Kronborg, Helsingør: 72 pp.

Thirslund, S. & Vebæk, C. L. 1990. Vikingernes kompas. 1000-årig pejlskive fundet i Grønland. – *Maritema* 4. – Handels- og Søfartsmuseet, Kronborg, Helsingør.

Vebæk, C. L. 1952a. A New World Benedictine Nunnery before the days of Columbus. – *The Illustrated London News*, May 3, 1952.

– 1952b. Vatnahverfi. En Middelalders Bondebygd i Grønland. – *Nationalmuseets Arbejdsmark* 1952:101–114.

– 1953. Klostre i de grønlandske Nordbobygder. – *Grønland* 5:195–200.

– 1956. Mellembygden. – *Grønland* 3: 92–98.

– 1966. Kirke-Topografien i Nordboernes Østerbygd. – *Grønland* 6:198–212.

– 1982. Vatnahverfi – en Indlandsbebyggelse i Nordboernes Østerbygd. – *Grønland* 5–7:207–217.

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