

Colonization in a Marginal Zone: The Norse in Greenland

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The reason for the collapse of the Norse colony in Greenland has been debated in the literature, with pirate attacks, plague, and hostile natives among the more prevalent explanations offered. This paper integrates a cultural and ecological approach, and suggests that no one single cause can be held accountable, except perhaps the entire range of attributes which made Norse society "Norse."

Introduction

The Norse settlement of Greenland is an example of a colonization effort that ultimately failed. This paper will argue that failure resulted from changing climatic conditions in an already marginal environment. The Norse adaptive scheme was developed for Scandinavia, and was unsuited to the harsh conditions of Greenland after the Medieval Warm Period (AD 900-1200). During the Medieval Warm Period, or the equivalent in North America, the Neo-Atlantic period, the climate of Greenland was similar to that in Scandinavia and the other North Atlantic islands colonized by the Norse. Norse society, when confronted with the harsher regime beginning after the thirteenth century, could not adapt. If the Norse had abandoned their traditional ways of life, they still would no longer have been truly "Norse."

Greenland is not unfit for human habitation, as the Thule Inuit (or Eskimo) colonization of Greenland has persisted until modern times. Inuit society is quite different from Norse society, and is based upon very different modes of environmental exploitation and cultural attitudes. The modern Inuit also exhibit biological differences from Europeans, which are tied to their bio-cultural adaptive system. While the biological aspects of the Inuit adaptive system can be overemphasized as an explanatory factor, the important feature is the overall integrated aspect of biology, social system, culture and environment. If all aspects of the integrated system are overly stressed, the people of that society are threatened. They must either change, leave or die.

Environmental Background

The island of Greenland is characterized by a large permanent ice cap, covering 86% of its surface (Maxwell 1985). At the period of Norse settlement, the temperature in Greenland was 1-2 degrees C higher than it is at present. This warmer period, which lasted from around AD 900 to 1200, is referred to as the Medieval Warm Period or the Neo-Atlantic period in North America (Wahlgren 1986:25; Ogilvie 1984:149; McGovern 1980:268 and McGhee 1970:174). Currently, Greenland is well within the area considered to be Arctic (see Maxwell 1985:6). The presence of the ice cap, despite the improved climate in the period of Norse settlement (see Dansgaard *et al* 1975), shows that the warmer climate did not significantly change the overall environmental situation. Greenland's habitable area is a kind of archipelago of ecological islands bordered by sea and continental ice sheet and divided by deep fjord systems and

rugged mountain ranges. Greenland's west coast may be broadly divided into two major botanical and climatic zones: a very wet, oceanic coastal zone and a drier, but florally lush continental zone at the heads of a few of the deep fjords of the southwest. Greenland's ice-free coast is dominated by the ocean currents that wash it (McGovern 1981; Oleson 1963:17).

While Greenland could potentially support a biological and botanical regime similar to that known to the Norse in Iceland and in Scandinavia, environmental conditions in Greenland were more severe than in other areas of Norse settlement (Gad 1970:37; Rousell 1941:8,212). Norse subsistence could be maintained in Greenland in the relatively warmer period of AD 900-1200, but with difficulty and had the constant possibility of stress or failure (see McGovern 1980:255 and below, p. 12).

Norse Expansion and the Colonization of Greenland

Originating from Scandinavia, the Norse raided and settled throughout Europe. Norse settlement was particularly strong in Northern Europe, specifically in Scotland, Ireland, and the Atlantic Islands: the Orkneys, the Faroes, the Hebrides, the Shetlands, Iceland and Greenland. The settlements in Scotland and Ireland were influenced by the more southerly peoples in Scotland, Ireland, and the kingdoms of the Anglo-Saxons and the Franks (Crawford 1987:213-214). Colonies in previously unsettled areas like the various Atlantic Islands maintained a higher degree of cultural homogeneity with Scandinavia (Gad 1970:35).

In AD 986, the first colonists left Iceland and settled in Greenland under Erik the Red. There were two other expeditions between 986 and 1000, but the third did not result in *landnam*, or settlement (Gad 1970:31-35). The Norse established two different areas, known as the Eastern and Western Settlements. The larger of the two was the Eastern Settlement, where Erik the Red established his homestead. Danish archeologists have identified about 330 Norse farms in the two settlements, and the population at its height is estimated at about 3000 (Magnusson 1980:215-216).

Norse Economy

The culture brought to Greenland was that of Iceland, transplanted as a whole (Rousell 1941:136). The Norse economy was based on limited farming, pasturage of animals, and hunting of marine and terrestrial animals. The need for ample grazing land was extremely important to the Norse, and that available in Greenland was very much like grazing land in Iceland. Iceland was fully settled at the time of the Greenland colonization, with the former's "Age of Settlement" ending in about AD 930 (Magnusson 1977:10). Iceland's grazing land had been claimed and utilized to its full extent, with the result that land in Iceland had been overgrazed: Iceland had suffered a famine in 972, fourteen years before the colonization of Greenland (Berglund 1986:110; Simpson 1967:40).

Permanent settlement was tied to areas of pasturage, which seems to have been the most culturally important landscape to the Norse. Pasturage was mainly available in the lowland areas of the inner fjords where the settlements are located (McGovern 1981:407; McGovern 1985:100). Pollen studies conducted in the vicinity of Brattahlid, Erik the Red's homestead, show the impact the Norse had on the lowland regions. Before the Norse settlement, the dominant species were birch, willow and elder. After

the Norse arrived, the dominant species were meadow plants brought by the colonists, such as sorrel, yarrow, wild tansy, and shepard's pouch. In addition, the Norse grew wild rye (*Elymus avenarius*), but on a relatively small scale (Wahlgren 1986:26).

Despite the importance of pasturage and domesticates, hunting, especially of seals, was a critical resource for the Greenlandic Norse. McGovern and others (McGovern et al 1983) studied the faunal remains from two Norse farms in the Western Settlement, which yielded information on the meat component of the Norse diet. On the more coastal farm, between 60% and 80% of the remains were those of seals, depending on the specific period. At the inland farm, about 30% of the diet was seal (McGovern et al 1983:98).

The Norse settlements, located at the head of the fjords, are not situated for easy access to the outer coastal areas that are the main habitat of seals. No harpoons or barbed spears have been found on Norse sites, so seal hunting probably took place through communal drives that forced seal pods (i.e. small herds or schools of seals) onto beaches or into nets (McGovern 1981:409).

Norse Housing and Climatic Adaptation

The Norse first built the same sort of house in Greenland as was found throughout the Norse world. This is the *skali*, or fire-house or longhouse, which has been found archaeologically in western Norway, Scotland, the Faroes, Ireland and Greenland, despite the lack of wood in Greenland. This house type is not well suited to the North Atlantic, with its wood-panel walls and the high fuel consumption of the long hearth (the origin of the name "fire-house"). The persistence of the *skali* is best explained by its cultural significance as a multifunction house and as the symbolic center of the household where the high seat was located (Stoklund 1984:98-100).

Roussell (1941) examines the development of housing in Greenland. Greenland dwellings are of three general types, all built of stone and turf: the longhouse or *skali*, the passage-house, and the centralized house. The earliest house was Erik the Red's house at Brattahlid, which was of the long-house variety. By the beginning of the eleventh century, or shortly after Greenland was colonized, the unsatisfactory nature of the long-house was felt in both Greenland and Iceland, a fact that led to the creation of the passage-house. The passage house had rooms in rows behind one another, connected by one or more passages. The smaller rooms were easier to heat, and had a measure of protection from the outside cold. Other areas of Norse settlement with severe climates, such as the islands north of Scotland, developed houses similar to the passage house (see Stoklund 1984). In Greenland, this development was taken to its fullest extent, where both dwelling and livestock were included in one structure. The centralized house absorbed the principal buildings of the farm with the fewest possible outside doors. This house-type was peculiar to Greenland alone, as no other country in the Norse world had the severe natural conditions of Greenland (Roussell 1941:202-213).

Norse Society

The social setting brought to Greenland was also that of Iceland, and of the broader European Norse sphere. The first settlers, or *landnamsmen*, chose both farmsite and farming strategy, which later dependent settlers had to follow by law and

custom. The system of *landnamsmen* created a socially stratified, hierarchically organized society bound by duty and dependence (McGovern 1985:100; Berglund 1986:109). This microcosm of Norse society was linked into the rest of the Norse world by trade and religion. Church tithes, one of the main forms of exchange, were mainly walrus tusks, but also narwhal tusks and arctic animals such as polar bears. These came from hunting expeditions along the coast north of the settlements (the *Nordrsetr*). The hunting expeditions reduced the dependence of payments from farm production, spreading taxes and tithes over a broader economic base (Gad 1970:136-137; Berglund 1986:110).

Christianity came to Greenland very early, and in 1124 the bishopric of Greenland was established. The advent of the Greenland diocese caused the social structure of the society to change, with landownership and power shifting away from the upper class farmers (the descendents of the *landnamsmen*) to the Church. By the mid-1300's, the Church owned approximately one third of the developed parts of the Eastern Settlement, making it the largest landowner (Berglund 1986:118-120; Gad 1970:130).

The attempt to replicate European Norse society can be seen in the naming of a Greenland bishop. The Greenland diocese contained no more than 16 parishes, while the smallest Scandinavian diocese consisted of 60 parishes. There were reservations about the small number of parishes, with the belief that there should be more before a bishopric was established. A bishop's duties and responsibilities, such as consecrating churches and burial grounds, blessing holy water and oil for Masses, deciding penances, and administering the Church, had a sufficient cultural importance that the diocese was established despite the small number of parishes (Gad 1970:58-60).

Although Greenland possessed a bishop, its religious structure was different from the rest of the Church. The bishops of Greenland were not elected by the canons of the diocese because Greenland had no assembly of canons. Instead, the Archbishop in Norway appointed new bishops. Even during the earliest period of the Greenland diocese (late 12th/early 13th centuries), there could be delays of 3 or 4 years before a new bishop was in place after the death of the old bishop. In the late period, delays were worse, with the bishopric vacant from 1348 to 1368 (Gad 1970:118, 141).

Despite the isolation of Greenland, the Church was very active. The bishop's ceremonial hall at Gardar was the largest in Greenland, and was surpassed by only one hall in Iceland. The Archbishop of Trondheim's hall in Norway was 186 sq. m, not tremendously larger than the 130 sq. m hall belonging to the Bishop of Greenland (Gad 1970:67-68). The expression of Church authority remained the same, and perhaps was proportionally larger on the distant margin of the Norse world.

Thule Expansion

At approximately the same time as the Norse, the Thule Inuit, ancestors of the modern Eskimo inhabitants of arctic Canada and Greenland (McGhee 1982:40), began to expand eastward from Alaska. In Arctic Canada, the European Medieval Warm Period coincides with the Neo-Atlantic period, lasting from AD 900-1200, with mean summer temperatures 1-2 degrees C warmer than the present (McGhee 1970:174). The initial expansion of the Thule seems to match with the Neo-Atlantic period based on site location and regional ecology evidence, though whether it occurred at the beginning or the end of the period is uncertain (Maxwell 1985:250). It has been suggested that the rapid expansion of the Thule occurred at the end of the Neo-Atlan-

tic or Medieval Warm Period, not the beginning, and coincided with the acquisition of iron by the Thule (McGhee 1983:23). Thule expansion into Greenland did not occur all at once, but in stages. The greatest expansion apparently occurred around the twelfth and fourteenth centuries, mainly in northern and central Greenland (Maxwell 1985:261). Thule expansion reached southern Greenland about the time the Norse disappeared; the Thule reached the Julianehaab District [the Norse Eastern Settlement] within the period 1350-1650 (Mathiassen 1936:84).

Inuit Adaptation to Cold

Inuit adaptations to cold are a major area of scholarly attention. The biological, social and technological adaptations of the Inuit are so closely inter-related that it is difficult to discuss a single element without also discussing another.

The Inuit economy is based around small but relatively permanent settlements oriented toward the seasonal exploitation of sea mammals. Sea mammals provide food, clothing and fuel in modern, "traditional" Inuit society.

Ringed seals, barbed seals, walrus, whales (especially bowhead, white, and fin types), and fish and shellfish are among the most important maritime resources exploited. Seals provide many raw materials that make Eskimo cold adaptation possible, such as mittens, boots, summer coats, trousers, and sinew thread. Coastal Eskimos rely for up to 83% of subsistence on marine and freshwater aquatic resources rather than terrestrial production (Moran 1981:5).

Historic Thule culture utilized a system of environmental exploitation similar to that of the modern, "traditional" Inuit (see Gad 1970:89; McGhee 1970:181-182), though during the period in question it probably had a richer economy (McGhee 1982:40). This sort of exploitative system requires certain biological traits like those found in the modern Inuit. While it is inappropriate to assume that historic peoples have the same cultural and biological adaptations as their modern counterparts, the cold adaptations of modern Inuit can be used as a model for the historic Thule populations, particularly since the modern Inuit are descendents of the Thule (McGhee 1982:40). Historic Thule Inuit and modern Inuit face similar environmental conditions. All Arctic populations are exposed to extreme and prolonged cold, extremes of daily and annual photoperiod, and low supporting biomass (So 1980:64).

Biological adaptations to cold serve as an interactive element in a complete system of adaptation. Without the biological elements, certain technological, socio-cultural and behavioral adaptations will not be successful at reducing cold stress, which can result in cold injury, frostbite, hypothermia, and eventually death (Moran 1981:3,6; So 1980:65). A closer examination of Inuit biological adaptations to cold is in order.

Inuit Biological Adaptations to Cold

The Inuit show indisputable evidence of true physiological adaptations to cold, either genetic or ontogenetic (So 1980:70). These adaptations include nonshivering thermogenesis, high rate of peripheral blood to the extremities, and high core-to-shell conductance (Moran 1981:20).

One adaptation the Inuit exhibit is an increased basal metabolic rate (BMR). An increased BMR raises the overall temperature of the body through the increase in the

energy consumption and utilization by the human system. While basal metabolic rate (BMR) has been linked to a diet high in protein and fat among the Inuit, there is a strong negative correlation between BMR and environmental temperature, with the highest values occurring in the arctic regions and the lowest in the tropics. While diet may influence BMR, a biological factor must also play a role (So 1980:69).

Cold-induced vasodilation and vasoconstriction (CIVD/CIVC) is another cold adaptation of the Inuit. This process determines the flow of blood from the warmer internal core of the body to the peripheries, such as hands, arms, feet and legs. There is a "generally consistent pattern of 'superior' response among the native peoples compared to the non-native controls when both are exposed to cold in both laboratory and field conditions. Here 'superior' refers to the maintenance of warmer extremity temperatures expressed as a higher average temperature, greater amplitude of CIVD, earlier time and higher temperature at the onset of CIVD, and a greater number of CIVD cycles" (So 1980:68).

Inuit subsistence such as hunting, trapping, and fishing requires a high degree of manual dexterity which can only be maintained if the fingers are kept reasonably warm. The physiological response of CIVD/CIVC would be advantageous in successful Inuit subsistence activity (So 1980:70).

Historic Inuit subsistence would also require similar sorts of biological adaptations as those exhibited by modern Inuit. The earliest "Neo-Eskimos" who came to Greenland in AD 900 apparently concentrated on hunting seals and walrus in a manner consistent with later Inuit practices and different from the Norse communal hunting techniques (Gad 1970:89). With the warmer ecological conditions, open-water whaling became more important with the rise in bow-head whale and decrease in ringed seal populations. When the climate grew colder again, seals could only be hunted at breathing holes in the sea-ice, much like the modern, "traditional" Inuit (McGhee 1970:176-182).

Norse-Native American Contact

When the Norse first arrived in Greenland, they met no Native Americans. Like most of the North Atlantic Islands colonized by the Norse, Greenland was uninhabited when the Viking settlers first arrived there (Magnusson 1980; Crawford 1987:213-214). This situation did not persist, with the Thule expansion and the further geographic exploration of the Norse.

In the New World the Norse came into contact with three major groups of native American peoples. In southern Labrador and Newfoundland, these were the Point Revenge Indians and the related ancestral Beothuck Indians; in northern Labrador, the Dorset Palaeoeskimos; and Thule Eskimos in Greenland and perhaps in eastern Arctic Canada (McGhee 1984:9).

Of these three groups, only one was a significant contact population for the entire duration of Norse habitation in Greenland - the Thule Inuit (McGhee 1984:15). The impact the other populations must have had, while potentially interesting and significant, is at this time entirely an area of speculation. Of all these populations, only the Thule occupied the same territory as the Norse [except for the temporary settlement of the Norse identified in northern Newfoundland, at L'Anse aux Meadows]. The contacts between the Thule and the Norse seem to have been fairly peaceful during the early periods, but in 1379, the Skraelings, as the Norse called the Thule,

attacked a settlement and killed 18 men (Gad 1970:147). Thule-Norse contacts seem to have been relatively limited throughout the Norse occupation, although they grew more frequent and apparently more hostile as the two culture areas increasingly overlapped.

Climatic Change and the Norse Collapse

Depending on different reports, the Neo-Atlantic or Medieval Warm Period ended sometime around AD 1200. Climatic conditions did not suddenly change, but went through a period of fluctuations for nearly 200 years before colder (see Ogilvie 1984: 149; McGovern 1980:268 and McGhee 1970:174). However, the changes were sufficient to impact on the already marginal economy of the Norse in Greenland. The more northerly Western Settlement was abandoned between 1341 and 1362, while the accepted date for the demise of the Eastern Settlement is the end of the fifteenth century (Gad 1970:145,172).

Norse subsistence depended heavily on grazing, as in Iceland. The climatic conditions were more severe in Greenland than in Iceland (Gad 1970:37), so climatic effects would be more pronounced in Greenland than in Iceland. Cold winters, one effect of the climatic change, reduce both hay yield and the availability of winter fodder, generally reducing the growth of grass. Haymaking and grazing is highly sensitive to climatic variation, both in Iceland and as transplanted in Greenland (Bergthorsson 1985:115,125).

Scandinavian stockraising techniques were already at their limits in Greenland, with chronic stillbirths among the cattle, sheep and goats wintering at the farms, and a critical spring shortage of dairy products for human consumption (McGovern 1980:255). As climatic conditions worsened, a series of years with poor hay harvest would impact unfavorably on both domestic livestock and hunted animals (McGovern 1985:104; Vibe 1967:156-157). These conditions would first effect the smaller farms on ecologically marginal holdings. The less prosperous farmers would be more vulnerable to debt and eventual tenantry. While tenantry would allow for a degree of "environmental buffering," hierarchical divisions within the society would be enhanced (McGovern 1985:104). The general level of stress would be distributed more evenly across the society, but would still remain. The environmental decline would still be continuing, and continued to reduce the available usable land for Norse domestic subsistence. It is possible the level of stress could have become so acute that the crisis conditions could not be alleviated (Berglund 1986:115).

In response to the lessened availability of domestic products, the importance of spring sealing grew. However, the success of the seal hunt was not guaranteed, but would vary with timing and coordination of the communal hunt, weather conditions, the security of the bases or camps on the outer fjords, threatened by both European pirates and the expanding Thule, and the actual seal migration (McGovern 1980:255--257; Dansgaard *et al* 1975:27).

The sensitivity of the Norse subsistence strategy to climatic degradation seems to have been an important element in the decline of the colony. It cannot be said however, that it played a decisive role. With a collapsing subsistence system, it would be expected that some measure of stress would show up in the human population. While in some isolated areas physical degeneration did occur (see Norland 1924), it did not appear in other areas. At both Gardar in the Eastern Settlement and in the

Western Settlement as a whole, physical degeneration or chronic disease resulting from reduced resistance or undernutrition related to climatic deterioration was absent (Broste and Fischer-Moller 1944:58; Fischer-Moller 1942:82).

At the same time as the climate worsened, events in Europe changed to the detriment of the Greenland colony. In 1262-1264 Iceland, formerly independent, was brought under the Norwegian crown. The Kingdom of Norway therefore controlled the trade with Greenland which was based out of Iceland. From 1300-1350, Norwegian trade in Icelandic dried codfish was brisk, as the Hanseatic League had cut off other avenues of supply to Norway. This trade collapsed in 1349 when Norway was struck by the Black Death. At the same time, expeditions to Greenland financed by the Norwegian crown ended. The Black Death reached Iceland in 1402-1404, and resulted in the death of about one third of the population. The Icelandic economy was devastated. European trade was picked up by English traders and fishermen, but the Greenland trade was not (Magnusson 1977:105-106).

The time of the rise of the Hanseatic League saw a general shift southwards to the Baltic Sea and the English Channel for both trade and political orientation. This left Iceland and Greenland to fend for themselves (Stoklund 1984:97-98). In the fourteenth century, and presumably until the collapse of the colony, any Norwegian ship that came to Greenland could not buy provisions without also buying other trade goods. The Greenlanders compelled visitors to engage in the Greenland trade, implying that it would not have taken place without coercion. In addition to the decreased level of intentional trade due to the Plague, walrus tusks, previously Greenland's main export, were no longer available as the northern hunting expeditions stopped after 1368, after the abandonment of the Western Settlement (Gad 1970:150-152).

The last dated connection between Greenland and Europe is a letter from 1414, which describes a wedding and a witchburning in 1408. The Eastern Settlement was still inhabited by the Norse until after 1480, but by about 1500, the Norse colonization effort had ended (Gad 1970:149,172).

While the Norse society was declining, Greenland did not become uninhabitable. As conditions for the Norse farmer deteriorated, they improved for the Inuit hunter. Conditions in southern Greenland were not ideal for the Arctic culture brought by the Inuit, which may explain why very few permanent Inuit settlements were established (Gad 1970:164-166). The Inuit were expanding into an area that was also marginal to their adaptive scheme, but on an opposite margin from the Norse. The conditions in southern Greenland were such that the Inuit subsistence strategy was less effective than it had been elsewhere, but it was not impossible.

The Norse response to climatic and social deterioration seems to have been an intensification of the existing social order. The buffer provided by the society in redistributive alms from the Church and other management techniques may have served in other periods of stress, but were insufficient for the marginal conditions of Greenland. Adoption of Inuit hunting techniques may have been effective, but this would also have entailed the exposure to heathen magic, which was counter to the Christian ethic of Greenland (McGovern 1980:266,272). Even if the Norse had adopted Inuit hunting strategies, they could not adopt the Inuit physiological response to cold, which while not focal, was an important ingredient in the overall success of the Inuit.

Surviving in the changed conditions would have required abandoning the European cultural roots of Norse society which the Norse had maintained for the entire period of the Greenland settlement (McGovern 1982:19), a solution which would have been

unacceptable (Berglund 1986:117). Indeed, the establishment and maintenance of some elements of European society, especially the bishopric, may have strongly contributed to societal stress levels. While the Church may have acted to help preserve some of the smaller farmers through redistributive alms, maintaining a bishop in a diocese one quarter the size of the smallest diocese in Europe put stress upon all the Norse residents of Greenland. Maintaining the bishop was economically disastrous, but not maintaining the bishop would have been equally disastrous for cultural and spiritual needs. The changing conditions did not create a reason for the collapse, but emphasized existing problems to the point of failure. The combination of climatic decline and cultural isolation reinforced the marginal position of the Norse Greenland colonies, and led to their eventual demise.

Conclusion

The Norse colony in Greenland attempted to replicate the Norse social world as it was in Europe. Its hierarchy was based on the *landnamsmen*, or first settlers, with the chief position held by Erik the Red and his descendants at Brattahlid. However, the colony's replication was incomplete. Greenland was still very dependent on Europe for many of the components of Norse culture, such as family and political contacts, material goods, and the Church. This dependence on Europe for religious needs decreased in the early twelfth century when the Greenland diocese was established, but Greenland's bishops were subservient to the European religious hierarchy, and the bishops were appointed from Europe, not from within the diocese. Without continued contact with the Norse societies in Europe, the Norse settlement in Greenland was incomplete.

As the climate changed, Norse Greenlandic society was not well suited to adapt to the colder weather. Norse subsistence had already been marginal in Greenland, and became insufficient to maintain the settlers once the climatic regime worsened (see McGovern 1982). Economic strategies were determined by the *landnamsmen*, who were least effected by the changing climate, and they maintained the existing system. The chief response to the situation was an intensification of religious activity in both almsgiving and resource expenditures. At the same time, events in Europe led to an abandonment of the Greenlandic trade, cutting off the cultural maintenance upon which the Greenland colonies depended.

With both the Norse social and subsistence systems failing, and those in power maintaining the existing systems, the only alternative model was that of the Thule Inuit. The Norse colonists were not suited to adopt this model, culturally, or perhaps even biologically. The unified nature of the Thule adaptive system, combining religious, social, technical and biological factors, meant that Norse adoption of the Thule scheme would have entailed the rejection of the society and cultural system which they had maintained for nearly half a millennium. The failure of the Norse Greenland colony was not due to any single reason, but resulted from a collection of stresses exacerbated by climatic change. The desire to maintain the Norse social and cultural system, and the inability to do so due to broad socio-political circumstances in Europe and climatic change, brought about the collapse of the Greenland colony less than a century before Columbus landed in the Caribbean and "discovered" the New World.

Figure 1.
Greenland showing locations of Norse Settlements.



Figure 2.
Skali, longhouse or fire-house. Redrawn after Stoklund (1984) fig.43.

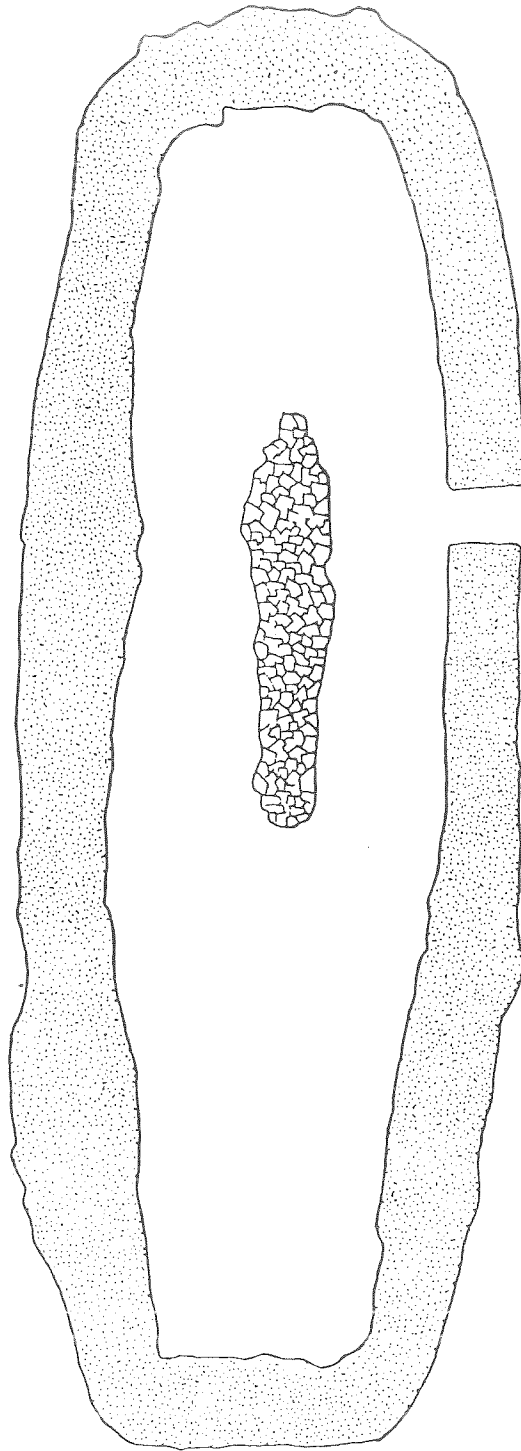


Figure 3.
Passage House. Redrawn after Stoklund (1984) fig. 56.

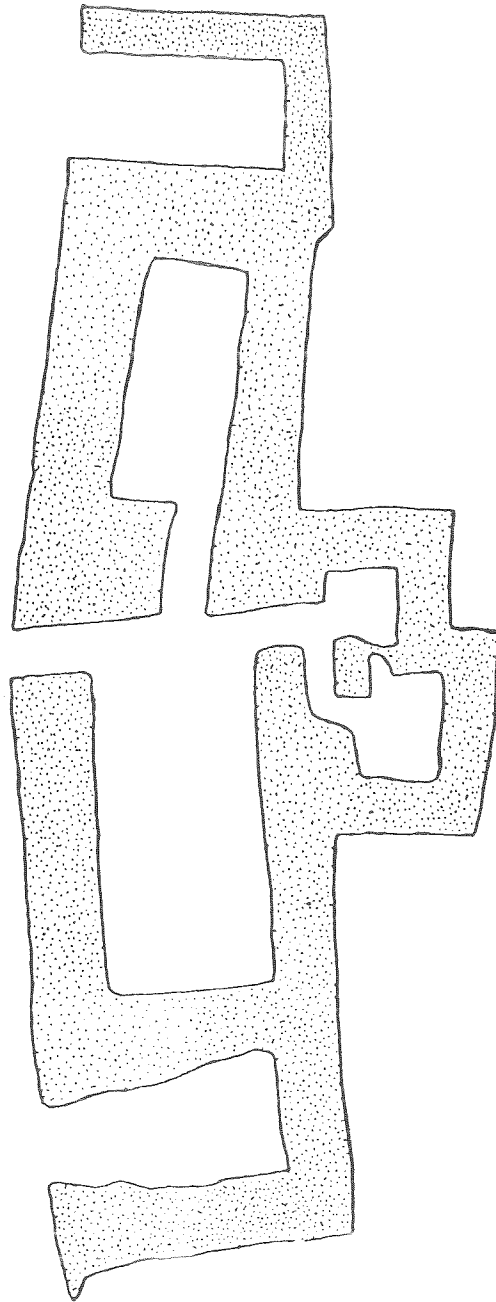
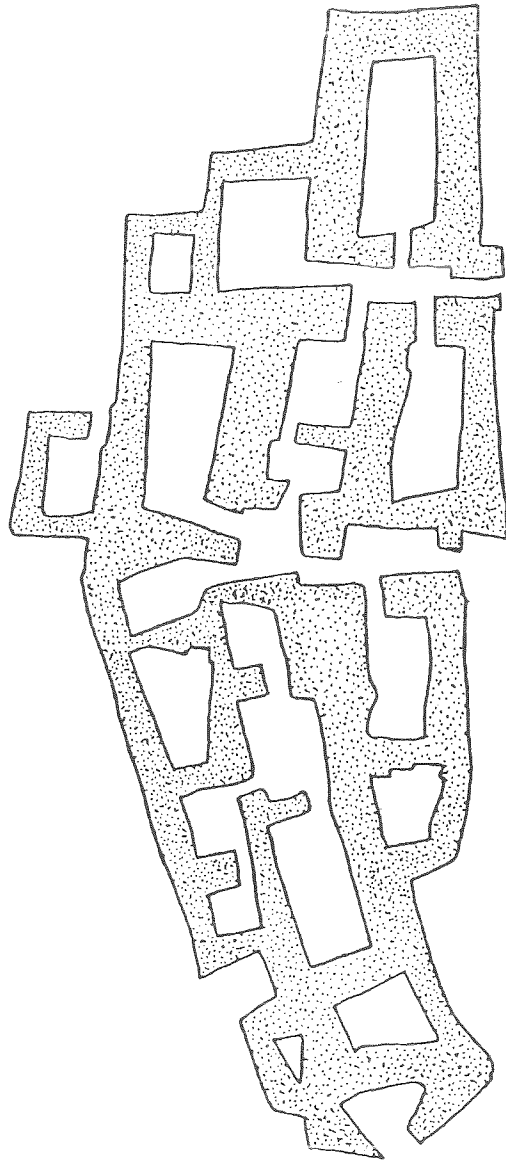


Figure 4.
Centralized House. Redrawn after Roussell (1941) fig. 110.



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