

**Study of Boat Figures in Alta Rock Art  
and other Scandinavian locations.  
With a view to elucidate their construction,  
and discuss the origin of the Nordic Boat**

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View from Ole Pedersen, 18 meters above sea level, with boat figure 44 in the middle of the foreground. Photo Karin Tansem, Alta museum

### ***Frontispiece***

The frontispiece is probably the oldest carving of a boat figure in Norway. It is located 26 meters above sea level at Kåfjord in Alta, showing a small boat with a reindeer figurehead superimposed on a larger elk head. Traced from photo by Karin Tansem.

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## ***Foreword***

My motivation for this thesis is a lifelong interest in, and experience with, boats and ships. I was brought up in a sailing and boating family, and I have a degree in Naval Architecture and Marine Engineering from MIT (1955).

I have also had an interest in carpentry and was a trainee in a yacht building yard and later in a naval shipyard before I started my university education. After my career in shipping and shipbuilding, I worked as a professional carpenter for about ten years. During this time, I obtained a certificate as master carpenter (tømmermester).

I was early interested in ancient ships and was given the book "*The Viking Ships, their ancestry and evolution*" (Brøgger 1951) for my birthday in 1954. After reading the book, my interest became focused on the early development of boats, and I noted Brøgger's uncompromising statement on page 13: "*The old confused idea that the first boat was a hollowed tree-trunk, the log-boat, or eike or whatever we please to call it - is founded on romantic notions of the life of primitive man*". Further down the same page: "*It is implicit in the very date of the old North Norway hunting culture that it can have known the boat in only one form, the boat of skin.*"

Brøgger interpreted the boat figures in the rock carvings of hunters and gatherers in northern Scandinavia as skin boats, while Swedish scholars interpreted the carvings as wooden boats. The early debate of "wood versus skin" which Brøgger initiated, thus became part of the search for the origin of the Nordic boat.

Through my work in shipping I have visited many maritime cultures around the world, and I have admired remains of many advanced log boats from older cultures. I therefore have the feeling that I could contribute to a better general understanding of this question.

An article I wrote on the peculiarities of the Klåstad ship was accepted in VIKING (Klem 2005). This encouraged me to apply for admittance to study archaeology at UiO.

I realized the fact that Alta with its World Heritage Site of rock carvings was noted for a marked postglacial land lift. Alta also had a substantial pine forest in the Boreal and Atlantic period. This gave me the idea to look into the boat figures of the Alta rock art, to see if I could find another approach to illuminate the construction and development of the boats of the hunters and gatherers.

## *Acknowledgments*

I am impressed by the work done, in uncovering all the rock-carvings referred to in this paper. I am also grateful for all photos taken of the carvings and the scanning of the private Kåfjord site. When not otherwise stated the pictures are taken by Karin Tansem at the World Heritage Center for Rock Art in Alta, Alta Museum. From the museum I have also had invaluable assistance from Heidi Johansen, who showed me all the locations in Hjemmeluft and drove me in her car to the Kåfjord site. I am also indebted to Arne A. Perminow and Ingrid Marstrander for letting me study the models at Ethnographic Museum (KHM) in Oslo. Ann Zwick and Brit Henschien have kindly helped me with the language and my dyslexia. Finally, I am grateful for the patience and encouragement of my advisor Christopher Prescott. The same goes for my roommate Bodil.

## ***Chapter 1: Introduction***

I have set out to analyze the boat figures of the hunters and gatherers. This has been tried several times before, by archaeologists, and by scholars from other disciplines. Many of them have good ideas up to a point, but the issues have been muddled by the question of skin versus wood as building material for the boats.

I regard this question a side issue. The skin theory probably originated from a misunderstanding of the natural conditions and qualifications of the oldest boat builders. Later the skin theory was reduced to a traditional viewpoint defended by farfetched examples and circular arguments. The discussion, however, provides an important background for my paper, and its main points will be included in later chapters.

In order to limit my paper and also my analysis, I needed a limited area for my observations, and have chosen Alta in Finnmark. This turns out to have had several advantages: It is a newly discovered site, the first carvings started to turn up in the 1970s (Helskog 1988: 12). The carvings were not known to the earliest scholars who studied rock art, and any conclusions drawn from these boat figures by me, will therefore not interfere with their judgment. However, some later work on rock carvings in Scandinavia in general includes the carvings in Alta, and gives a good background for their place in Scandinavian rock art tradition (Vourc'h 2008 and Gjerde 2007 and 2009).

The carvings are located in a region where seagoing craft was a prerequisite for survival in the Arctic Stone Age, and there is no doubt that the boat figures represent boats in common use at the time of carving (Westerdahl 1987: 18). The so called Komsa culture, the original name given to the Arctic Stone Age or Mesolithic period in the northernmost part of Norway, is named after a site in Alta, and is believed to represent one of the earliest populations in Norway. Gutorm Gjessing was convinced they came from the east (Gjessing 1941: 85).

It is interesting to note that it is presently under debate whether these people came from east or from south (Løvø 2008). As a curiosity it could also be mentioned that Peter Andreas Munch (1810-1863) and Rudolf Keyser (1803-1864) presented their "immigration theory" in the 1840s, the most speculative part of which concludes that the first Norwegians came to Scandinavia from the East, populating Norway from the North (Munch 1852: 4 and Keyser 1866: 20). This question has even been brought under discussion in genomics, by showing that the Haplogroup Z of mitochondrial

DNA is common among people both in Kamchatka and Finnmark, but less common in the southern parts of Norway (Ref: Reykjavik City Museum, 871+ -2).

Alta is located in an area where pollen analyses from nearby sources confirm the existence of a local pine forest about 7000 years BP (Hyvärinen 1985). This shows that material for building wooden boats were readily available. Few woodworking tools have been found in the area except the common slate axes and slate knives. However, there is a greenstone formation in Kvenvik, from which woodworking tools would have been made (Vourc'h 2008: 29).

Most carving sites in Alta display one or more boat figures. The sites are spread over a wide area, and the figures are distributed over a wide range of elevations, but the boat figures are remarkably consistent between different sites of the same level. Due to well documented and uniform postglacial land uplift (Helskog 1988: 32, Arntzen 2007: 26 and Vourc'h 2009: 39), it is possible to give approximate dates for the carvings. The carvings are believed to have been carved along the water's edge, after the rock face emerged from the sea and before it was overgrown by vegetation. Boat figures may therefore be traced from some time after about 5800 years BP, to 2000 years BP and later.

My only disadvantage at UiO is the distance from Oslo to Alta. However, in 1985 the rock carving sites in Alta were registered as a UNESCO World Heritage, and a museum was established and given adequate economic means to photograph and document all carvings. The Museum in Alta is also very well staffed, and they have given me invaluable assistance. I could always call upon the Alta Museum for additional documentation. Therefore, what I will be doing is not fieldwork, but what in the past, in heated discussions, has been termed "mere deskwork" or "armchair philosophy".

With all these advantages I should have an easy job cut out for me, but the difficult part is not my access to rock carving pictures, or the conditions of their origin, or for that matter under what conditions the boats themselves were made. It is, as with all archeologies, to figure out what was in the minds of the shipwrights and carpenters 6000 years ago.

To what use were the first boats made, was it to cross a river or move along a waterway, was it to reach an island with bird nests or was it for fishing? Boating must have started out using rather primitive equipment, but very soon it must have developed into something that could be used for travel. It must have been easier to



travel along the coast, even with a primitive craft in days of fair weather, than to travel over land. Time was of little importance and they could wait for suitable weather to move their camp to a better place or to go fishing.

It has been argued that a simple dugout was not suitable for crossing to the islands along the coast. Granted that lives were probably lost at sea in the same way they are today, but it is still impossible for us to appreciate, or understand, the dexterity and perseverance of the Stone Age seaman.

In this paper I will argue that all the boat figures in the Alta rock carvings do represent wooden boats. Further I will argue that the boats were developed from the dugout, first with an improvement of the prow structure, then by adding freeboard, and finally by reinforcing the boats for greater longitudinal strength, to end up very similar to the Hjortspring boat. I believe the first boats in Alta were made by hollowing out large local pine trees. I know that many Norwegian scholars still believe that boat figures in Stone Age rock carvings represent skin boats, as decided by Brøgger. In archaeology it is impossible to have proof, but in this paper I will give what I will think of as circumstantial evidence, supporting my arguments. To accomplish this, I will first describe how earlier scholars interpreted the boat figures of hunters and gatherers, and what arguments they used.

A chapter on early research will start with an interpretation of boat figures in Norway 180 years ago, but will concentrate on the work done by Gutorm Gjessing from 1936, which led to the theory put forward by Anton W. Brøgger and Haakon Shetelig in 1950.

To be able to compare and analyze the carvings in Alta I need to be familiar with the rock carving tradition of the hunters and gatherers in Northern Scandinavia and eastward to Northern Russia. I will therefore introduce my analysis with a general section on the rock art of the hunters and gatherers. Except for the earliest boat figures in Alta which may be compared to other North Scandinavian and Russian figures, the later Alta figures, all seem to have a characteristic and uniform character of their own.

The paper includes 80 boat figures from Alta, independently numbered from my other illustrations, listed in a catalogue which also includes preliminary comments on some of the figures.

The very oldest carvings of the hunters and gatherers usually show elk, reindeer and an occasional bear in almost life-size pictures, like the Bøla reindeer in Nord-Trøndelag (Gjessing 1936: Pl. XIII). In Fennoscandia these carvings are believed to go back at least 6000 years (Helskog 1988: 11). The boat figures are

believed to be slightly younger, the oldest boat figure in Kåfjord in Alta have been dated from postglacial land uplift to (not before) 5800 years BP, when a flat rock face in Kåfjord emerged from the sea and became “available” for carving.

The area I will be studying is part of the circumpolar region. To evaluate the boat carvings in relation to the prehistoric and traditional boats in this region, I want to discuss the access to wooden materials and the subsequent boat building tradition in this region, starting with Gjessing’s map of skin boat distribution (Gjessing 1944).

Referring to building traditions, I also find it important to describe how boat builders of other cultures have solved the basic construction details in their boats and canoes. I have indirectly been encouraged in this respect by the Swedish archaeologist Albert Eskerød. He was of the opinion that material from “less advanced regions” may give insight into technical solutions on one side and the level of technical skills on the other (Eskerød 1956: 59). He saw this as one way to understand the possible solutions that the Stone Age boat builder might find useful to make his boat more seaworthy, take a bigger load, and be easier to handle. However, I will bear in mind what Humbla criticized his contemporaries for doing in 1937: “*discussing parallels from other foreign cultures, and with speculative reasoning, to make claims---*” (Humbla 1937: 11). I will instead show similarities in construction details between boats from other cultures, and what we find in our prehistoric boats. I will find out if some of these construction details may be hidden in the carvings. And vice versa, find out if some peculiar details in the carvings can be explained by solutions from other cultures. I will also discuss how these attributes have been explained in earlier research.

I believe the Hjortspring boat (Rosenberg 1937 and Crumlin-Pedersen 2003) does have details in common with a group of carvings (my generation IV) and I will therefore make an extensive analysis of the Hjortspring boat, to have a reference to the analysis and discussion of that generation of carvings in Alta.

A chapter on Alta will describe in more detail the climate in the Mesolithic and Neolithic periods, the results of several pollen analyses and the postglacial land uplift in the area. This information will give an important background for the ecological conditions on one hand and the chronology of the development of boats on the other.

## ***Chapter 2: Research History***

### *Background and definitions*

The boat figures in the rock art of the hunters and gatherers have been a very controversial subject among Scandinavian scholars. Before I analyze carvings from the Stone Age in Alta, in order to draw my own conclusions, I will refer and in some cases comment on earlier research and interpretation of boat figures in rock art. This has been a topic of discussion in Norway for more than 180 years, starting with Christie and Neumann in 1828.

The dating of rock art seems to have been one of the first obstacles to the understanding of the boat figures. Wilhelm Frimann Koren Christie (1778-1849), the founder of Bergen Museum in 1825, together with Bishop Neumann and Rector Dahl, contemplated some newly discovered rock carvings at Leirvåg in Atløy. They decided the carvings must be Viking ships, in commemoration of a battle in AD 874 in nearby Stavenæsvaag, where Atle jarl lost his life (Christie 1837: 91-97).

Another obstacle was the literal way in which the carvings were explained. In 1934 A. Køstler submitted the idea that the boat figures represented two-storey rafts (Halldin 1952: 17). A more considerate contribution to the discussion was made by Gjessing in 1936. This will be commented more extensively later. Finally, the publication of the Hjortspring find in Als, unearthing a boat that actually looked like some of the boat carvings, showed that these carvings could be interpreted as wooden plank boats (Rosenberg 1937).

A parallel to the discussion on interpretation of *boat figures*, however, was a separate discussion on the origin of the *Nordic boat*.

This discussion was accentuated more than 100 years ago by the German scholar Eduard Hahn in an article “*Über Entstehung und Bau der ältesten Seeschiffe*”. He does not believe that useful ships like the Viking-ships could have been developed from the dugout. Instead he suggests that the sewn boat of bark or skin must be the origin. He describes skin boats used by hunters and fishers, and refers to the “Bullboat” used by the American Indians as well as to the “Coracle” used in Ireland. He points in particular to the skin boats of the Eskimo (Hahn 1907: 44).

These two seemingly different topics converged in 1937 when the Swedish scholar Philibert Humbla criticized scholars of “*discussing parallels from other foreign cultures, and with speculative reasoning, to claim that the oldest Nordic boats were made of skin or bark and sewn*” (Humbla 1937: 11). Humbla’s reference is to

Hahn's article, but it is also valid as a comment to Gjessing's claims in his book "*Nordenfjelske Ristninger og Malinger av den Arktiske Gruppe*" from 1936, where he proposes that boat figure carvings in Norway from the Stone Age may represent skin boats of the Eskimo type (Gjessing 1936: 130).

In 1950 (English version 1951) A.W. Brøgger and Haakon Shetelig wrote the book "*The Viking Ships: Their Ancestry and Evolution*" they adopted Gjessing's theory that the Nordic boat was developed from the skin boats of Northern Norway (Brøgger 1951: 14). Humbla on the other hand, with his description of the Bjørke boat in 1949, sticks to his view that the Nordic boat was developed from the dugout (Humbla 1949: 17).

The "*Skin-versus-wood-discussion*" has thus become an important issue relating to the possible structures behind the rock carvings. As my paper is primarily concerned with analyzing the construction of the boat figures in the Alta rock art, it is important first to sort out the question of construction materials. The opinion of the more recent debaters will therefore be recorded. However, I will first define some terms and expressions used in the following.

The *Nordic Boat* is defined as a wooden boat built in the *lapstrake* or *clinker* fashion, with the planks overlapping, as opposed to the *carvel* construction of the Mediterranean, where the planks are joined edge to edge. The lapstrake construction may use thinner planks, and generally results in a lighter hull. The building method is "*shell first*" with the frames inserted after the hull is nearly finished. With the carvel construction, the frames are usually erected first and the planks fitted to the frames. In some cases, however, the shell may be molded first also in a carvel fashion, but in that case the planks will first be fitted to temporary templates. To bring the definition one step further, the Nordic boat is considered to be an open boat, double ended, with a slightly curved keel (Crumlin-Pedersen 1970: 226). The modern descendant of the Nordic boat is the small clinker-built "sjekte", now also produced in glass fiber.

The *rock art* in Scandinavia is divided in two categories: the carvings of the *hunters and gatherers* from the Mesolithic and Neolithic periods, including Arctic Stone Age, and the carvings associated with *early farming* from the Scandinavian Bronze Age. The rock art of hunters and gatherers do in some places contain boat figures, although the carvings are mostly depicting game. The rock art of the Bronze Age has on the other hand a large proportion of boat figures, among figures connected to farming and fertility cults.

The term *Skin Boat* will refer to the boats of the Eskimo, more often the Umiak, built on a wooden frame of driftwood, and usually covered with walrus hide.

The term *Dugout* will be used to characterize a boat hollowed out from a log, also called “log boat”.

A *Washstrake* is any extension of the sides of a dugout to increase the freeboard.

The *Hjortspring boat* (Rosenberg 1937), has been pointed out as an important stage in the development of the Nordic boat, and is also considered an important link to the boats depicted in the rock carvings. A discussion and an analysis of the Hjortspring boat will therefore be included in a separate chapter.

### *Interpretations*

Since 1828 several scholars have attempted to interpret the boat figures in rock art. In the following I will give an account of the most important contributions to this discussion. However, as already mentioned, it is difficult to separate interpretation of the *boat figures in rock art* from a theory on *boat development*, as one seems to be dependent on the other.

Gutorm Gjessing was probably the first Norwegian archaeologist to take a serious interest in early boatbuilding. His interest was not only the excavations of Iron Age burials and wrecks; he also tried to interpret the boat figures in the rock carvings of hunters and gatherers in search of clues as to their construction. Already in 1936 he had ideas about what was hidden behind the Evenes boat figures, and he actually launched several alternative possibilities for their construction.

In his book *Nordenfjelske Ristninger og Malinger* he first refers to his colleague Th. Petersen’s view, who thinks the boat figures must represent dugouts. Gjessing agrees with him at first, but is worried about the seaworthiness of the log boat in coastal service. In some of the boat carvings at Evenhus he finds indications of a better construction. He mentions the subdivisions with bulkheads, but points out the high stems, which will make the boats more seaworthy. This, in my opinion, is an important observation which I will come back to later.

Gjessing then states (my translation and bold lettering):” *In any case, the **high stems** we see on some of the Evenhus boat figures must be due to a construction method using special stem planks as structural elements. - On the other hand the **bulkhead** and stems may also remind one of the skin boat. The flair of the stems*

makes this plausible and the **contour** of the boats may resemble the Eskimo Umiak –. On the contrary, the find of Stone Age **skis and sledge runners** show that there is no technical obstacle to thinking of the boats of the hunters and gatherers as being built with wooden planks” (Gjessing 1936: 130). However, Gjessing did not come forward with a conclusion to his many suggestions, but his mentioning of skies and sledge runners is important, and will be referred to later.

The science of pollen analysis was not well established in Norway before 1940, and the first pollen analysis in Finnmark and Fennoscandia where probably not done before 1960 (personal information from Helge Høegh). This will explain what Gjessing wrote in 1941 (my translation): “*To make a dugout you need a forest. But when the first Komsa people started fishing and seal hunting on the coast of Finnmarken, there was no forest, barely some shrub –*” (Gjessing 1941: 86). Later in the same book he refers to the Ringsaker carvings which he believes to depict a dugout, this due to the location along Lake Mjøsa (Gjessing 1941: 88).

Due to a lack of suitable building material, the Greenland Eskimo built their boats from pieces of driftwood covered with Walrus hide. The comparison with the Umiak was therefore a likely alternative for Gjessing, who later concluded this view in his article *Circumpolar Stone Age* (Gjessing 1944: 12).

Gjessing based his assumptions on carvings from Rødøy, Skjomen and Evenhus. Some typical boat figures from these sites are shown below.



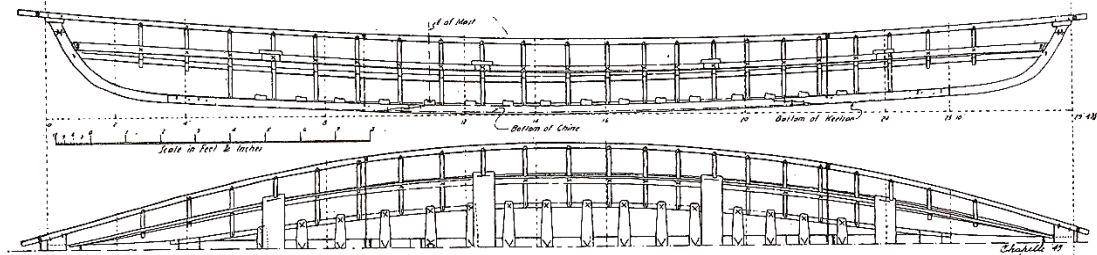
**Illustration 1** Rødøy (left) and Skjomen carvings. From Brøgger 1951: 15



**Illustration 2** Evenhus carvings from Brøgger 1951: 17

At this stage I have difficulties in following Gjessing’s conclusion that the *contour* of the boats look like the Umiaks. When I look at the overhanging stems in

the carvings, it is difficult to be reminded of the contour of the Umiak as illustrated below. Bulkheads are also nonexistent in a Umiak or for that matter in a Kayak. They do exist in dugouts, where ribs have been left in the wood to stiffen the sides. Furthermore, many dugouts use a large stone in the forward part as ballast conceivably as shown in illustration 2, on the left.



**Illustration 3** North Alaskan Whaling Umiak, from Adney 2007: 187

The profile of the Umiak is flat with very little sheer. This is also illustrated on a decorated ceremonial skin from east Siberia, a detail of which is shown below.



**Illustration 4** Detail of a decorated ceremonial skin from East Siberia, from Fitzhugh 1988, page 309

Gjessing's original opinion was in a way noncommittal by mentioning the possibility of wooden planks, he left the field open for further research. His observations will be an important contribution to this paper. In my chapter on Boats of the Circumpolar Region, I will show that wood might have been preferred as boat building material if and when it was available.

A.W. Brøgger and Haakon Shetelig referred to and accepted Gjessing's theory that the Stone Age rock carvings at Skjomen, Rødøy and Evenhus did indeed refer to skin boats, and reproductions of the carvings are included in the book (Brøgger 1951: 15 and 17).

Two things happened. The first to happen was that the theory was accepted among Norwegian scholars, who started referring to the Evenhus carvings as the original skin boat. The second thing was that the discussion, which continued about the origin of the Nordic boat, did no longer refer to Stone Age rock art, but was to

some extent reoriented towards the Bronze Age boat carvings and the Hjortspring boat.

However, there was still a difference of opinion in Scandinavia, as to whether the skin boat or the dugout was the origin of the Nordic boat. Brøgger's statement "*Even the Viking ships, with their peculiar system (of lashings), must be supposed to have developed similarly from the log boat with a strake on it. I need hardly say that I regard this theory as mere deskwork*" was badly received by the Swedish scholar Albert Eskerød who stated: "*It is in this connection a little curious to note the tendency by scholars who are following a personal idea to characterize the opposite opinion as a result of mere armchair philosophy*" (Eskerød 1956: 80). He states that until Brøgger's opposite theory was published, it had been no serious doubt that the Nordic boat had derived from the dugout. Eskerød is of the opinion that Brøgger, with the help of Shetelig and Per and Eva Fett, decided that certain early (Stone Age) boat figures represented skin boats and that later (Bronze Age) boat figures could represent plank boats (Eskerød 1956: 82).

Eskerød was one of the early contributors in the discussion of the origin of the Nordic boat. In his article in 1956: "*Early Nordic-Arctic Boats, A Survey and Some Problems*" he discusses the development of the Nordic boat. Brøgger's theory is brought under evaluation in several places (Eskerød 1956: 70ff). Eskerød is searching for more and better background information in the form of new finds, and refers to *rock carvings* as a possible but difficult source to interpret. He also believes that material from *less advanced regions* may give insight into *technical solutions* on the one side, and the standard of *technical skill* on the other, all in combination with the *raw materials available* (Eskerød 1956: 59). I have followed Eskerød's advice and devoted a chapter to boats of other cultures. This has been both rewarding and surprising, as many of the constructions found in the Pacific Islands use the same solutions we see in the Hjortspring boat.

Brøgger apparently, had no difficulty in interpreting the boat figures, and mentions especially the design of the prow, which he finds uniform in all of the figures. He admires the high and stylish curve and states: "*This form is beyond any ever reached by the Greenland skin boats. One would not have supposed that a skin boat built on ribs could give such opportunities for elevation of the prow. Here it is quite unmistakable, and is such a constant feature in all the boats that we must assume the Stone Age tribes had found some natural and easy way to solve the problem*". He then goes on to discuss the transitions between the keel and the stems in



the boat pictures: “Almost without exception, these transitions are strikingly abrupt, almost right-angled”. --- “Such a hull would be inconceivable in a plank-built boat and quite incompatible with the log boat” (Brøgger 1951: 18).

The vertical high stems or prows at right angles to the keel line is very pronounced in the Evenhus carvings, while the Skjomen boat carving has a very pronounced flair. When Brøgger commented that a construction with the stems at right angles to the keel would be “inconceivable” in a plank boat, he must have had the curved stems of the Viking ships in mind, rather than the vertical stems of the boats from Bindalen and further north. A vertical stem in an extended dugout is also quite compatible with what Gjessing calls a “stem plank”, which in a dugout could support the washstrake.

Following Brøgger’s next comment of how this type of stem was possible in a skin boat, one must agree with him in his statement: “*that one would not have supposed that a skin boat could give opportunity for an elevated prow*”. However, Brøgger uses this feature in the rock carvings to prove that the Stone Age tribes managed just that. This is in way of a circular argument, using the carvings as proof of his theory about the carvings (Brøgger 1951: 18).

Gustav Hallström, in his book *Monumental Art of northern Sweden from the Stone Age*, 1960, has collected 288 boat figures from Nämforsen, and has collected most of the known carvings from Lake Onega (28 boat figures) and also boat figures from Vyg. He refers to Brøgger and Shetelig and their belief that the Evenhus figures represent Umiaks, and confirms my opinion that Brøgger’s theory apparently was accepted by most Norwegian archaeologists at the time (Hallström 1960: 296). Hallström, however, opposes Gjessing’s statement about the carvings in the White Sea region (Vyg), which Gjessing states to be *clearly* skin boats (Gjessing 1944: 15). In that connection Hallström writes: “*Certainly they are in no way connected with the skin boat*” (Hallström 1960: 353). In his comment to a possible representation of skin boats at Evenhus, he is illuminating a point that also Gjessing pointed out, that the high stems must require a special construction method: “*The finished stem ornament in the form of an elk head would seem to call for a different construction of the hull from that which the skin boat can offer. The same demand must also be made upon the projecting “spur” of the keel line, so typical of the Vyg carvings, as well as of a good many at Onega and Nämforsen*” (Hallström 1960: 354).

Evidently Hallström and Gjessing could have agreed on the importance of the conspicuous high (ornamented) stems, and that these stem planks, as originally

suggested by Gjessing in 1936, might have been a cue to an interpretation of the carvings. It is also interesting to note the protruding keel line pointed out by Hallstrøm. This is present in most of the Alta boat carvings (Hallstrøm 1960: 345).

Detlev Ellmers describes the first attempts of man to master the marine environment, in his article "*The Beginnings of Boatbuilding in Central Europe*" (Ellmers 1996/2004: 11). He refers to the dugout, but points out that: "*during the late Ice Age trees tall and thick enough to make dugouts simply did not exist*". He then refers to the Evenhus boat figures and explains that because building materials were scarce as the first hunters and gatherers reached Scandinavia, the skin-covered boat with frames made from reindeer antler were their only alternative.

In the same way as Brøgger admitted that to explain the transition from skin to wood was going to be difficult (Brøgger 1951: 42), Ellmers, in his chapter on the dugout, explains that "*the transition from the skin boat to the dugout was not simply a matter of continuing the development of existing boatbuilding technology.*"----"*This new method of construction was not adopted out of bitter necessity; rather it was a matter of opening up a new and supplementary method of boatbuilding, which turned out to be one of the crucial transition points in the history of boatbuilding and water transport*" (Ellmers 1996/2004: 15). He then goes on to discuss the evolution of the wooden boat in Europe.

Ellmers' reference to the Evenhus carvings deserves a comment. The fact that reindeer hunters ventured into the treeless tundra to hunt, and that they did not, when there, find building material for boats, may be correct. But they had no use for boats while on the tundra, except for crossing an occasional river. For this purpose they might have constructed a temporary craft like a "Bull-boat", as the Indians probably did on the American plains (Hornell 1970: 148). Such a craft could conceivably have been constructed from Reindeer antlers and Reindeer skin, but would not bear any resemblance to the Evenhus carvings or support Brøgger's theory. Furthermore the Evenhus carvings have been dated to about 3700 years BP, or Neolithic period, when building material must have been abundant in that region (Vourc'h 2008: 457).

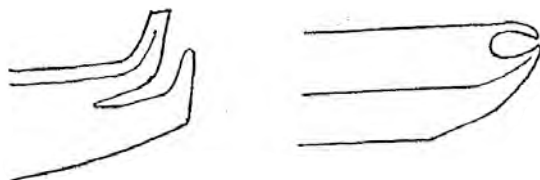
Christer Westerdahl has an article called "*Et sätt som liknar them uti theras öfriga lefnadsart*", where he describes the ancient Sami boat building and boat handling. In this article he has a paragraph on boat figures in the rock carvings of Northern Norway. Due to the necessity of boats in the region, he is convinced that the figures are true representations of the boats. He then goes on to discuss the question of

skin versus wood, and rejects the argument that wood was scarce in those regions. He claims that forests were established within a few hundred years of melting of the ice, and that that period would be too short to establish a skin boat tradition. He also believes it strange that carvings of assumed skin boats should appear as much as 3000 years later (Westerdahl 1987).

In a very interesting and thoroughly documented book; “*The Sea-craft of Prehistory*”, Paul Johnstone refers to the Evenhus boat figures in his chapter of *Skin Boats* (Johnstone 1980: 28). He also refers to Ole Klindt-Jensens book “*Denmark Before the Vikings*”, where Klindt-Jensen describes the Mesolithic settlement at Ulkestrup and for some reason believes they used a skin boat to reach a small island (Klindt-Jensen 1957: 22). The island was a short distance from the shore, and this may be a good example for the use of a simple “Bull-boat.”

Johnstone interprets the Bronze Age boat carvings as skin boats (Johnstone 1980: 29), an opinion that is probably inherited from Brøgger (Brøgger 1951: 41). Johnstone is of the opinion that the keel-extension shown on the boats was there to protect the skin when beaching, and refers to Aleutian Kayaks having a similar “cleft bow” presumably for protection (Johnstone 1980: 33).

Ørjan Engedal, in his article: *På bølge og berg – båten i røind og ristning*, has also misinterpreted the vegetation history in Alta (Engedal 2000: 171), where the earliest boat figures are from about 5000 BC. In the question of skin vs. wood he is therefore in agreement with Paul Johnstone, and uses many of the same arguments. The cleft bow of the Eskimo Kayaks, for instance, are purely for decoration and also in some cases used as a handle (Adney 2007: 198-200 and Brindley 1919: 132).



**Illustration 5** Figurehead decorations of Kayaks, left: Bering Island Unalaska right: Unuligmut St Michael Alaska, from Brindley 1919, page 132.

These decorations were also observed by James Cook on his voyage in Alaskan waters in 1778. He states that they tied a stick across the opening to avoid collecting debris floating in the water (Cook 1785: 515). When the Eskimo enters or leaves the Kayak he paddles alongside the beach, and steps carefully in or out as the

case may be not to upset the Kayak. It is therefore difficult to understand how the cleft bow of the Kayak may be there to protect the skin. Johnstone admits that neither the Irish Curragh nor the Eskimo Umiak has the cleft bow, but points out that it is unmistakable in the Bronze Age rock carvings. This also resembles a circular argument, not unlike the one used by Brøgger.

Sverre Marstrander was probably the last scholar to defend Brøgger in his book *“De Skjulte Skipene, Tuneskipet, Gokstad-skipet og Osebergskipet”* 1986, by describing an experimental craft built by the Oldsaksamling of the University of Oslo together with English archaeologists, sponsored by broadcasting stations in England and Norway. The experiment was a direct result of the ongoing debate of skin versus wood, and an attempt at interpreting the Bronze Age carving in Scandinavia (Johnstone 1980: 108). The boat in the experiment was intended to look like a Bronze Age carving, and had a false, protruding keel attached underneath to protect the skin, and not as the Hjortspring boat, an extension of the keel plank.

Marstrander seems convinced that the experiment went a long way toward verifying the theory that the Bronze Age carvings did represent skin boats (Marstrander 1986: 10ff). He refers to Gjessing’s interpretation of the Evenhus boat figures as skin boats, and to the Hjortspring boat as being developed from the skin boat. He also suggests that its wooden construction subsequently was the origin of the later Nydam ship and the Viking ships. The last statement could be plausible if he was thinking of the transition from a carvel construction to a lapstrake construction. I will elaborate on this in my chapter on the Hjortspring boat.

Anders Berntsson is one of the latest authors to interpret boat figures in rock art. He is also mainly concerned with carvings from the Bronze Age, and refers to Flemming Kaul’s article *“The Hjortspring boat and ship iconography of the Bronze Age and Early Pre-Roman Iron Age”* (Crumlin-Pedersen 2003: 187-200). However, some of his own opinions need to be commented on. He first rejects the theory launched by Brøgger and Shetelig, and agrees that Paul Johnstone and Sverre Marstrander probably have blindly followed in Brøgger’s footsteps.

He then starts discussing the origin of the Nordic Boat, and seems to agree with Crumlin-Pedersen that the expanded dugout is a good candidate. Berntsson differentiates between the hard dugout, which he characterizes as a large boat for sheltered waters, and the expanded dugout as the smaller boat for longer voyages and rougher water. I agree that the expanded dugout will be more seaworthy because of a higher freeboard, but I do not follow the argument about a “large” hard dugout. The

beam of the hard dugout is limited by the trunk of the tree it is made from. This gives a fairly narrow hull with little stability. One way of increasing stability, if you cannot make the boat wider, is to make it longer. However, it seems to be a common belief that the long dugouts are made that way to accommodate more people or cargo, my belief is that they are made longer to increase stability (Chapman 1949: Vol I, page 99).

In his article Flemming Kaul has made an extensive study of Bronze Age ship figures in rock art. He points out that all ship carvings from the early Bronze Age (Period I, around 1600 BC) shows an asymmetric hull form, mostly with stabilizers underneath the keel aft. He demonstrates that this feature changes toward a symmetric profile in Pre-Roman Iron Age. He refers to several rock art sites in Sweden, Norway and Denmark (Bornholm), but unfortunately not to any sites in Alta. However, several of the boat figures in Alta from between 1700 BC and 400 BC (boat figures 62 through 73 fit the description of the Hjortspring boat, but are all without stabilizers. One of the boats is even shown with six paddles and a steering oar.

Many of the Norwegian scholars seem to have gone along with Brøgger and Shetelig and their theory that the first boats in Northern Scandinavia were skin boats. This seems also to be true for some German and English scholars. Swedish scholars on the other hand, are of the opinion that the dugout is the origin of the Nordic boat.

Most, if not all the advocates of the skin boat theory, have, to use another legal term, weak cases. The most important weakness is the misunderstanding that there was a lack of suitable building material in the north. This misunderstanding goes a long way to explain and excuse Gjessing, Brøgger and Shetelig for their opinions. Later, others have just followed in Brøgger's footsteps without reflecting seriously about the question. Some have even (like Brøgger) used circular arguments to prove their points.

From the above contributions to the interpretation of the boat figures in the carvings of the hunters and gatherers, two important criteria seem to emerge: the *high stem* noted by Gjessing who suggested a use of *special stem planks as structural elements*, and the *protruding keel line* pointed out by Hallstrøm to disqualify the use of skin. These details will be kept in mind when the Alta carvings are analyzed and discussed.

### ***Chapter 3: Boats of the Circumpolar Region***

In order to understand the boat figures in the rock carvings of hunters and gatherers, I have to understand how boats were made as far back in time as possible, and under what conditions and environments. My paper will analyze rock carvings in the northern regions of Scandinavia, bordering on the Arctic. I find it therefore necessary to study the environment in the Arctic or circumpolar region and the boats that this region produced, both in historic and prehistoric times.

In describing the boats of the circumpolar region I will distinguish between traditional boats, which have been in use in historic times, and prehistoric boats found during archaeological excavations. The last category will include boats found as far south as the island of Als in Denmark. However, all of the boats described have probably been used in most of Scandinavia, and will all be descendants of the boats shown on the rock carvings. By definition, they may therefore also illustrate part of the development of the Nordic boat. Some boats that I believe belong to a prehistoric tradition even if they are dated to historic times, will also be included.

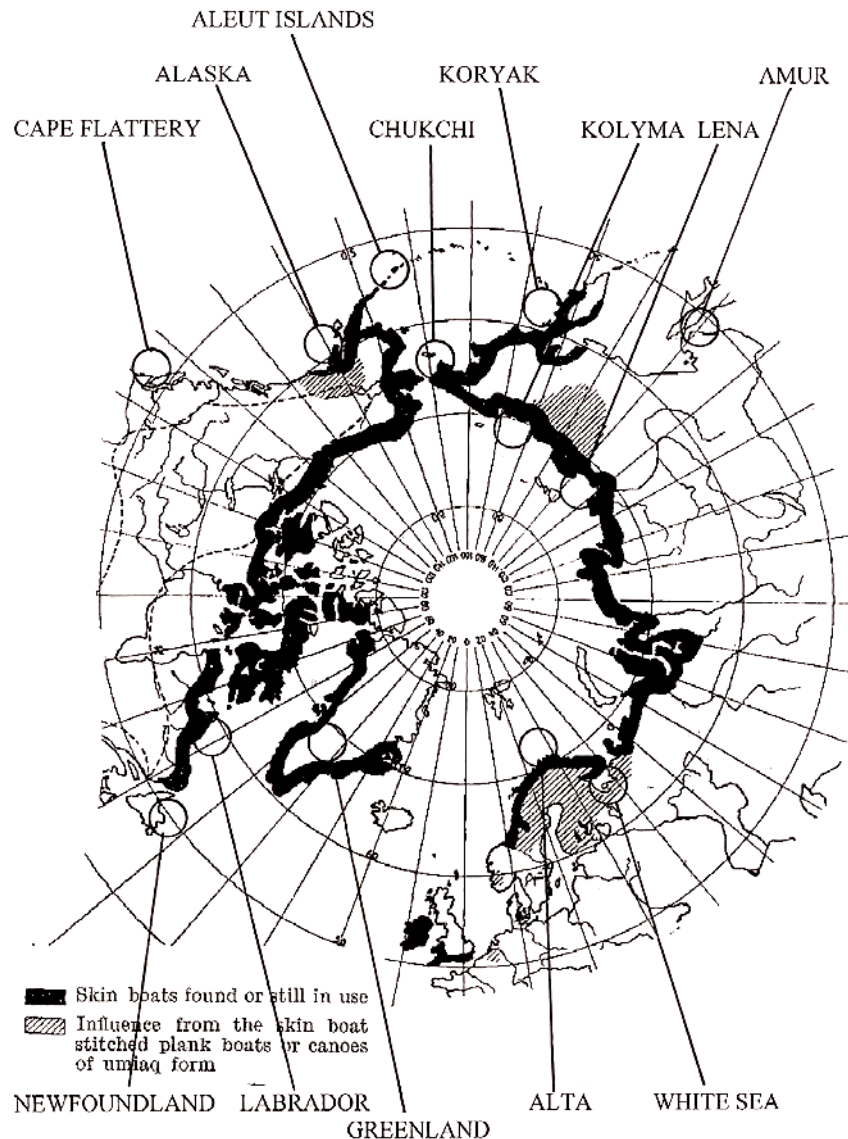
The environment in prehistoric times as far back as the first boat carvings will be based on pollen analysis and supplementary climate information. The forests, and thus the availability of material for dugouts and other wooden boats, have changed over the last 6000 years in many places of the world. In the circumpolar region it seems as though the trees were larger and more abundant in the slightly milder climate beginning about 8000 years BP.

Gutorm Gjessing has written an article "*Circumpolar Stone Age*" (Gjessing 1944) where he claims that some aspects of the North American Indian and Eskimo culture are similar to that of the late Stone Age along the arctic coast from Norway to the Kola Peninsula. He believes this is due to a culture convergence which may be explained by the assumption that these cultures have been evolved under similar conditions of nature. On the other hand he explains that there seem to be no limit as to how far cultural impulses may reach, given enough time. He points in particular to the implement culture, and uses the convergence hypothesis to also include boats.

In my experience, craftsmen sometimes find identical solutions to structure problems as far apart as Scandinavia and the Philippine Islands. This may or may not be a result of culture convergence, but rather the result of a natural practice to achieve a given objective within the resources and techniques available.

In his map of skin boat distribution along the Arctic coast, illustrated below, he includes not only the Norwegian coast as far south as Trondheim, but also Ireland and the southern districts of England where they have traditionally used the skin covered Curragh (Hornell 1970: 142) and the Coracle (Hornell 1936) respectively.

### ARCTIC REGION



**Illustration 6** Facsimile of Gjessing's map showing distribution of skin boats in the Arctic Region (Gjessing 1944: 13). Superimposed on Gjessing's map are the main areas of tribe locations referred to in this chapter

In the hatched areas in the above map he claims there has been an influence from the skin boat culture to the sewn plank boats used in recent times by Skoltesamer in Norway and Finland, around the White Sea, the Kolym delta in Siberia and the southern parts of Alaska. More recent scholars debate this view on the grounds

that first of all the term “skin” for the material of a boat side has an anthropomorphic background and is no proof of the origin of skin boats in Northern Norway. Secondly, sewing of wooden implements has a long tradition among most historic and prehistoric cultures, not only in connection with boats, but primarily for buckets and other containers. Furthermore, the technique of sewing planks together in watercraft is widespread also in southern regions all through the Pacific, and may therefore be called universal (Westerdahl 1987: 18 and Prins 1986: 11).

The areas where he refers to sewn boats in his map seem for a large part to coincide to areas where northern forest limits reach the coast. This could mean that wooden vessels actually were preferred over skin boats in these same areas.

### *Materials for Boat building*

Materials for boat building have varied widely around what is termed the Arctic coastline. Both the east and west side of *Greenland* have been and still are barren country, and the Eskimo had therefore only driftwood for their boatbuilding. The driftwood would consist of windblown trees, and would come across the Arctic Ocean with the ice driven by wind and current, mostly from the Siberian coast but also from Alaska.

Fridtjof Nansen was the first to take advantage of this current, when he drifted across the Polar basin with “Fram” (1893-1896). New mapping of shore deposits on the north coast of Greenland indicate that the ice in the Polar basin was greatly reduced about 6-7000 years ago due to a warmer climate, accommodating further the transport of driftwood (Løvø 2008).

Since about 6000 years BP the southern parts of *Labrador* had spruce and pine forests, and were populated by Indian tribes. Most of the coastline and all of the northern parts had forest tundra and tundra. This region was mainly populated by Eskimo (Fitzhugh 1984).

Fitzhugh has informed me privately that the Beothuks of Newfoundland and the recent Indians of Labrador seem traditionally to have used bark canoes. He writes:-- *But during the Maritime Archaic period 6000-3500 years BP, they may have been using dugouts, as we find big stone axes and gouges (concave chisel) in the archaeological collections, presumably for use building dugout boats.*”

He continues: “*Something to keep in mind is that even dugout boats may have been made in the south and traded or obtained by northern people who may not have*



*had sufficiently large trees for local manufacture. This is suggested in the archaeology: gouges in particular become quite scarce in the central and northern Labrador MA sites in the 4500-3500 BP period, whereas they are quite common in Maine, Nfld, and southern Labrador”.*

Fitzhugh writes that wooden boats were coveted by the Baffin Inuit also in historic times (16<sup>th</sup> century). This indicates that the Eskimo may even have preferred dugouts to their skin boats, if and when wooden boats could be obtained from the south (information on e-mail 16 and 20 February 2010 from William W. Fitzhugh) (Fitzhugh 2010).

Along the *West Coast of America* from Vancouver and as far north as the southern part of Alaska, large forests contain the Western Red Cedar and to a lesser extent Alaska Yellow Cedar. These were the main species used for the large dugout canoes used by the Indians in this region (information on e-mail 29 October 2009 from Jim Gillis, Haida Forest Products, British Columbia) (Gillis 2009).

There also seem to be some evidence that even the Indians along the American northwest coast might have traded wooden vessels with the Eskimo further north, as far as the Chukotka peninsula: A rock carving in that area portraying the “mushroom people” shows a whaling scene where the boat used has a remarkable likeness to the whaling canoes of these Indians (Fitzhugh 1988: 129).

The age of discovery is the period in history when Europeans started to explore the world around them. For the first time they came into contact with other cultures. The explorations started in the 15<sup>th</sup> century and continued in some parts of the world into the late 18<sup>th</sup> century. Many of these peoples lived by the sea and therefore it was natural that they were the first to come into contact with Europeans. Captain James Cook was one of the first to explore the northern part of the Pacific Ocean. On his third voyage 1776-79, Cook was commissioned to find a northwest passage from the Pacific to Europe (Cook 1785). This brought him along the Alaskan coast, and, near Cape Sucling, he went ashore on Kayes Island (Kayak Island?). He describes the trees there as “—*far from being of an uncommon growth; few appearing to be larger than one might grasp round with his arms, and about forty or fifty feet high.*”(12 to 15 meters) (Cook 1785: 351). He went further north into Prince William Sound in *Alaska*, and from there headed west along the Aleutian Islands, all of which he describes as barren. Somewhere along the Alaskan coast the trees apparently became too small for dugouts and skin boats were the only other alternative.

Across the Bering straight in East *Siberia* both the Chukchi and the Koryak tribes also used skin boats due to lack of wood for boat building, but the northern limit of forest changes near the Kolym river delta and extends almost to the coast. Further west along the Siberian coast in the Lena river delta the forest limit is also close to the coast (Fitzhugh 1988: 10). These two areas coincide with Gjessing's map (Ill. 6) of stitched plank boats.

The *European* Atlantic and Arctic coast, going north from Trondheim, has normal woodland today. However, the climate 6000 years ago was milder, and in some locations, as for instance in the Alta region, there was a large pine forest which even today produces trees of more than one meter in diameter (Hyvärinen 1985). The photo below show one of several large pine trees surviving in the Alta region.



**Illustration 7** Large surviving pine tree in The Alta region. Photo Ole Magnus Rapp 2008

### *Traditional Boats*

I will start with the Coracle which, if not a typical arctic boat, is probably the most primitive of all boats. It has also been used in all corners of the globe, from South America to Asia. The Coracle was used in North America by the Plains Indians under the name of Bull-boat, probably because they only needed the skin of one buffalo bull to construct it. It was common among others in the Sioux and Cherokee Indian tribes (Hornell 1970: 148). The Bull-boat is also believed to have been used in Siberia (Brindley 1919: 137). See photo on next page.



**Illustration 8** Bull-boat of the Sioux Indians.

From Hornell 1970, PLATE XXV, (courtesy of the Museum of the American Indian, Heye Foundation, New York)

The Irish Coracle, indirectly referred to in Gjessing's map, has been used until recently for fishing in small rivers and ponds, both in Ireland and in England. The Curragh is another skin covered boat which is common in Ireland, it is probably a fairly recent (early middle age) construction, appearing as an enlarged and reinforced Coracle, and in my opinion the result of an inferior carpenter tradition.

Boats and canoes made from tree trunks are called dugouts. Two types of dugout are referred to: the hard dugout and the soft dugout. The hard variety is the most common. It is made as the name implies by digging out the inside of about two thirds of the log diameter. The dugouts found in Scandinavia are usually quite blunt in both ends. To obtain stability the hard dugout is usually made very long. Stability increases with added length as well as with added beam (Chapman 1949: Vol I page 99). The dugout is best maneuvered from a stern position and if the taper of the log is reproduced in the boat, the widest part is used at the stern. To compensate the trim for the man in the stern, a large stone was usually carried in the forward part of the boat. To get fire when using a torch for spear fishing a small hearth was often arranged in the after part of the boat (Cunliffe 1997: 105).

The soft dugout is also made from a hollowed out log. The log is excavated from a narrow opening along the top of the log, and the sides are left very thin. When this work is finished, the sides are forced apart with heat and warm water. This treatment results in a wider boat with a higher freeboard. The technique is known all over the world (Arima 1975: 61, Best 1976, Prins 1986: 9 and Skamby Madsen 1985). See photo on next page.



**Illustration 9** Dugout of expanded or soft type, from Skamby-Madsen 1985

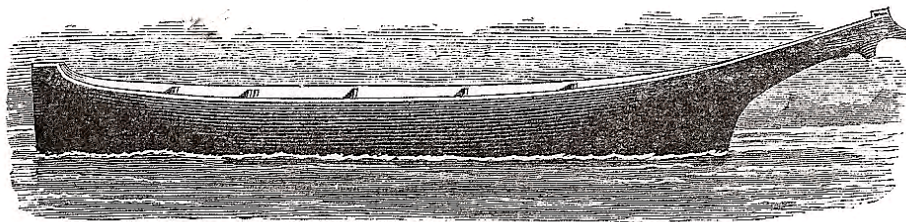
Another type of dugout was seen by Captain James Cook on his third voyage in the Pacific Ocean, when commissioned to investigate a possible northwest passage. He came from Hawaii to the Oregon coast of North America in March 1778. He passed a cape, which he named “Cape Flattery.” However, he did not observe the Strait of Juan de Fuca, and went on to Vancouver Island where he anchored in Nootka Sound. Here he was the first European to see the Great Canoes. *“Their canoes are of simple structure; but, to appearance, well calculated for every useful purpose. Even the largest which carry twenty people or more, are formed of one tree. Many of them are forty feet (12.2 m) long, seven feet (2.1 m) broad, and about three (0.9 m) deep. From the middle, toward each end, they become gradually narrower, the aft part, or stern, ending abruptly or perpendicularly, with a small knob on the top; but the forepart is lengthened out, stretching forward and upward, ending in a notched point or prow, considerably higher than the sides of the canoe, which run nearly in a straight line. For the most part they are without any ornament; but some have a little carving, and are decorated by setting seal’s teeth on the surface, like studs; as is the practice on their masks and weapons.*

*A few have, likewise, a kind of additional head or prow, like a cut-water which is painted with the figure of some animal. They have no seats, nor any other supporters, on the inside, than several round sticks, little thicker than a cane, placed across, at mid depth. They are very light, and their breadth and flatness enable them to swim firmly, without an outrigger, which none of them have; a remarkable distinction between the navigation of all the American nations, and that of the Southern parts of the East Indies, and the Islands in the Pacific Ocean. Their paddles are small and light; the shape, in some measure, resembling that of a large leaf, pointed at the bottom, broadest in the middle, and gradually losing itself in the shaft, the whole being about five feet (1.5 m) long. They have acquired great dexterity in managing*

*these paddles, by constant use, for sails are no part of their art of navigation*” (Cook 1785: 327).

The canoes were later described by James G. Swan. In his book *“Indians of Cape Flattery”* 1870. He describes the Makah Indians, and their process of hollowing out the canoes. He also described their method of wedging out planks from the trunk of a tree. They used the planks for their houses, and he measured planks being up to five feet (1.5 m) wide. He writes that a whaling canoe invariably carries eight men; one in the bow who is the harpooner, one in the stern to steer, and six to paddle. The canoe is divided into six compartments by sticks which also serve as thwarts. The canoes come in three sizes: the largest, the whaling canoe, a medium size carrying six men, and a small canoe for fishing (Swan 1870). Apparently they only used the smallest dugouts or canoes, for fishing. True, their dugouts had excellent seakeeping qualities compared to the traditional inland European dugout, and they may have been able to catch fish in sheltered waters.

Fig. 6.



Whaling canoe.

Fig. 7.



Whaling paddle.

**Illustration 10** The whaling canoe, paddled by six men. From *“the Indians of Cape Flattery”* by James G. Swan 1870: 21. See also Fitzhugh 1988: 170

Although these dugouts were hollowed out from large diameter timber, they fitted a type of wing stem to raise the bow even further. This wing stem was carefully integrated in the wood as shown below, and secured with “dove tail” mortices.

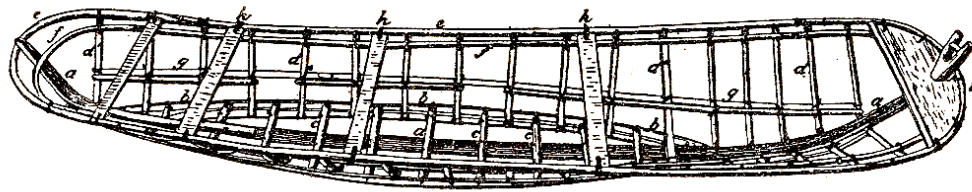


**Illustration 11** Wing stem being fitted to the bow of the canoe, from Arima 1975: 144

When James Cook reached Prince Williams Sound in May 1778, he encountered Eskimos with their skin boats. He was searching for a northwest passage and compared the boats he saw with the familiar Greenland Umiak.

*“Their boats or canoes are of two sorts; the one being large and open, and the other small and covered. I mentioned already, that in one of the large boats were twenty women, and one man, besides children. I attentively examined and compared the construction of this, with Crantz’s description of what he calls the great, or women’s boat in Greenland, and found that they were built in the same manner, parts like parts, with no other difference than in the form of the head and the stern; particularly of the first, which bears some resemblance to the head of a whale. The framing is of slender pieces of wood, over which the skin of seals, or of other larger sea-animals, are stretched, to compose the outside. It appears also, that the small canoes of these people are made nearly of the same form, and of the same materials with those used by the Greenlanders and Esquimaux; at least the difference is not material. Some of these, as I have before observed, carry two men. They are broader in proportion to their length than those of the Esquimaux; and the head or forepart curves somewhat like the head of a violin” (Cook 1785: 371).*

From Cooks description of the large canoe, he might have encountered the Koryak type popular among the Eskimo further west (Eastern Siberia and Kamchatka).



**Illustration 12** The Bidarra as used by the Koryaks of Eastern Siberia (After Jochelson) From “Water Transport” by James Hornell 1970: 160

The Greenland and the north Alaskan type of Umiak has a more pointed bow and stern, but is otherwise built with the same type of materials.

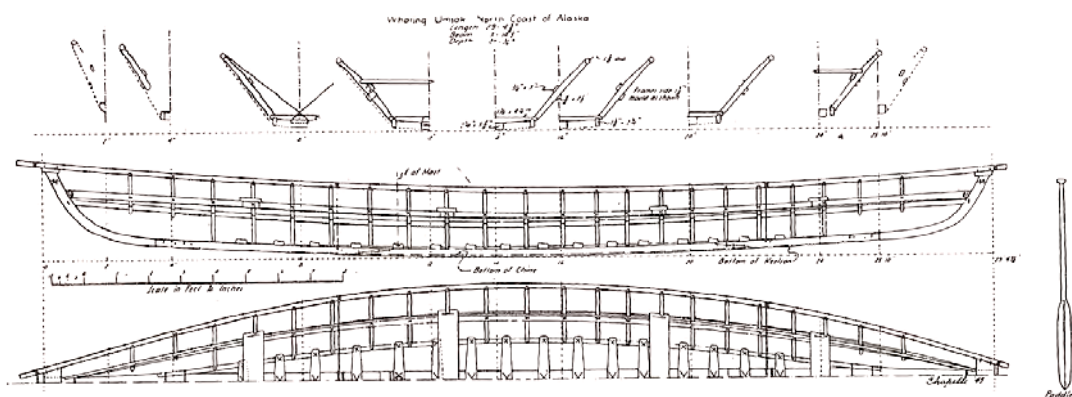
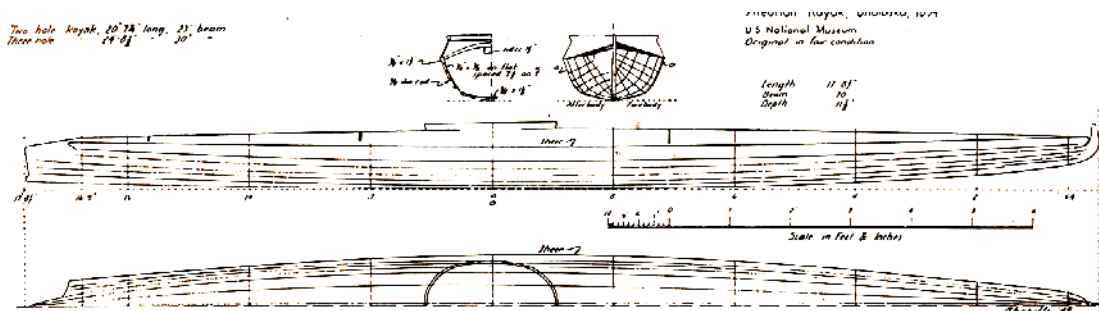


Figure 171

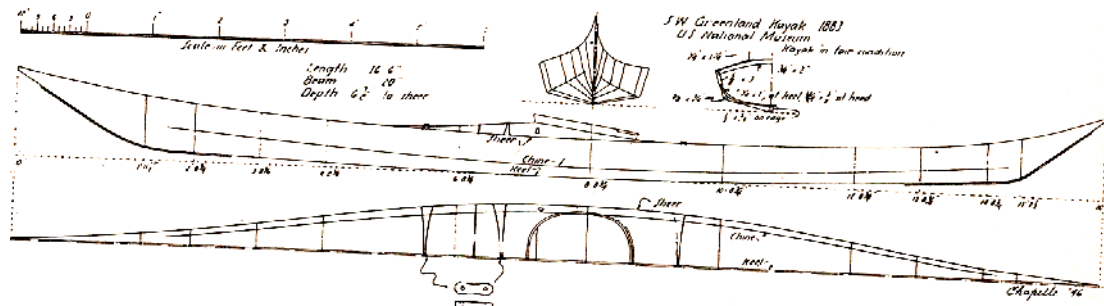
NORTH ALASKAN WHALING UMIAK of about 1890. Drawn from damaged frame, formerly in a private collection, now destroyed.

**Illustration 13** The north Alaskan Umiak. From “Bark Canoes and Skin Boats of North America” by Edwin Tappan Adney 2007: 187

The modern Kayak is inherited from the Eskimo and has had the same basic construction up until our plastic age. It had originally a frame constructed with pieces of driftwood, covered with sealskin. The Kayak is built differently in different locations, and the shape differs widely. Construction drawings of an Alaskan type and another type from Greenland are shown below.



**Illustration 14** Aleutian Kayak, Unalaska, from Adney 2007: 196



**Illustration 15** Southwestern Greenland Kayak, from Adney 2007: 210

Further west, in the Aleutian Islands Cook encountered more canoes, he writes: “*The canoes made use of by the natives are the smallest we had any where seen upon the American coast; though built after the same manner, with some little difference in the construction. The stern of these terminates a little abruptly; The head is forked; the upper point of the fork projecting without the under one, which is even with the surface of the water. Why they should thus construct them is difficult to conceive; for the fork is apt to catch hold of every thing that comes in the way; to prevent which, they fix a piece of small stick from point to point. In other respects, their canoes are built after the manner of those used by the Greenlanders and Esquimaux*” (Cook 1785: 515).

H. H. Brindley in his article “*Notes on the Boats of Siberia*” (Brindley 1919), distinguishes between “*boats which are used exclusively by aboriginal peoples of Siberia,*”--- and “*boats which are probably not of Siberian origin, but which have long been used by aboriginals and presumably, have not been greatly modified by them*” (Brindley 1919: 130 and 138). In the first category he mentions several types of the “Umiak” or “Bidarrah” and of the Kayak or “Bidarka,” as already described. In the second category he describes several plank built boats sewn with willow strands and twisted osiers, and also dugouts.

He mentions a most interesting boat called Schitiki. He described this boat as a dugout with a washstrake built up with wattle (Brindley 1919: 140). Presumably the wattle is smeared and made watertight with clay (in the manner of the composite basket boats found in Vietnam and mentioned by McGrail (2006: 56). This type of construction found in an Eskimo region does point to the fact that wooden boats, even extended with interwoven twigs, were preferred over skin.



### *Prehistoric Boats*

Prehistoric boats from the circumpolar area will include boats found as far south as the island of Als in Denmark. All of the boats described have probably been used in most of Scandinavia. In this section I have also included some boats that I believe to have been built in a prehistoric tradition, although they may be dated to historic times.

A relatively well preserved dugout from the Mesolithic period in Denmark was found in Tybrind Vig. The boat belongs to a coastal tradition and is probably built from Lime. It is about 9.5 meters long, and was probably built with a slightly raised square prow (Christensen 1988: 133 and Cunliffe 1997: 105).

Ancient dugouts made from pine are seldom found in the archaeological material for the simple reason that in building a dugout all the heartwood is removed, which is the part of the pine which has the best durability. A dugout from Fiskeby in Hälsingland, Sweden is dated to 750-400 BC, which makes it one of the oldest pine dugouts unearthed in Scandinavia (Ulfhielm 2007).

The Hjortspring boat is probably the most famous prehistoric boat in Scandinavia. It was found on the island of Als in 1921 and excavated by G. Rosenberg (1937). Due to military equipment found in connection with the boat, it is assumed to be a warship. It is a wooden boat, pointed in each end with a slightly curved keel and a semi-lapstrake construction method using extremely thin and wide planks. It has an unusual winged stem structure forward and aft, not commonly found in prehistoric boats in Scandinavia. In profile the Hjortspring boat has a marked similarity to some of the boat figures in Scandinavian rock carvings. The boat is dated to about 350 BC. The Hjortspring boat is an important piece in the puzzle to interpret the boat figures of the rock carvings in Alta, and will therefore be described and discussed in more detail in a separate chapter.



**Illustration 16** Model of the Hjortspring boat, from Crumlin-Pedersen 2003: 64

The “Hampnäs boat” is revived from *one thwart*, found while digging the foundation of a house in Hampnäs in Ångermanland, Sweden, in 1920. The thwart is believed to originally have sunk to the bottom of the bay where it has been covered by clay and silt. The thwart is dated to about 200 BC (Ramqvist 2009: 98).

It was “rediscovered” in 1990, when it was realized that the thwart was very similar to the thwarts in the Hjortspring boat. One difference is that the Hampnäs thwart is made of pine instead of lime, as used in the Hjortspring boat. It also has a slightly different way of attachment to the frame.

Although only the one thwart has been found, it opens two interesting aspects. First, that a boat apparently of a similar type to the Hjortspring was used this far north, and secondly that this thwart is made of pine, indicating that it probably also was constructed in the northern region.

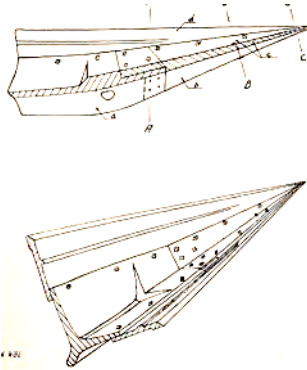
From the evidence of the Hjortspring boat and the Hampnäs boat it is interesting to note that the way the thwart is connected to the frame in these two boats, is in principle similar to the way the thwarts are connected in the Nydam boat about 700 years later, and also in the modern wooden, clinker-built ‘sjekte’. This does show the persistence of a well established technical solution.

The Haugvik boat is again a find where only a few fragments of the original boat have survived. The fragments, consisting of three short pieces of planking were first dated to early Pre-Roman Iron Age (Sylvester 2006: 97), but the final dating has since been stipulated to about 150 BC (Sylvester 2009).

The surviving pine planks have two distinct lashing-clamps left in the wood. However, these planks are originally taken from wood being of partly sapwood and partly heartwood. An extended width in one of the planks is bordering the sapwood part of the material, and there is no indication that this part of the plank is close to the edge. I have been given access to view the planks, and I believe this indicates that a third lashing-clamp could have existed at this point. This being the case the planks in the Haugvik boat could have been up to 47 centimeters wide, almost as wide as the planks of the Hjortspring boat.

Apart from the Nydam ship (Engelhardt 1865), dated to about AD 320, which will not be discussed in this paper, another well preserved boat, also from the Early Iron Age has been discovered in Bjørke, in Gästrikland, Sweden. The boat is built on the basis of a hollowed out log in the same way as the Hjortspring boat, but with the addition of only one wide strake on each side. It seems to have been an experimental design, as the bow and stern extensions are of a peculiar and cumbersome

construction. It looks like an attempt to fashion a pointed bow by lashing on an extension to the basic hollowed out log (Humbla 1949). However, it could well be one of the ancestors of the later modern stem.



**Illustration 17** Bow construction of the Bjørke boat, from Humbla1949: 23

A slightly younger boat found in Halsnøy in Norway (Schetelig 1903) dated to about AD 340, has a design that may be compared to the Bjørke boat. It has been reconstructed by Knut Sørnes who believe it had a wing type keel extension with the first strake sewn on to the sides. The second strake, he believes, was sewn through the upper part of stem, having a conventional form (Sørnes 2009).



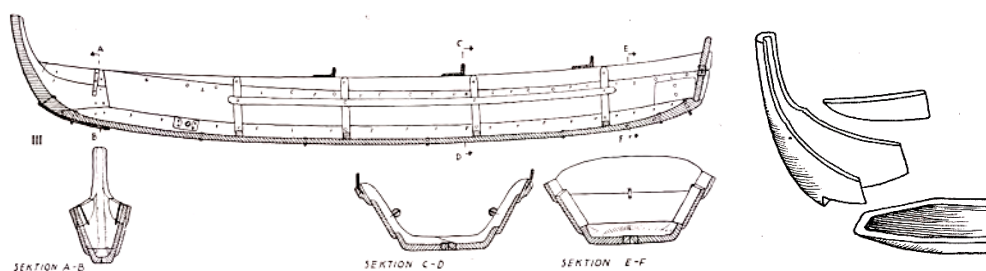
**Illustration 18** Proposed reconstruction of the stem in the Halsnøy boat. Photo Stein Dale

One of the oldest boats found in England is the Brigg log boat dated to about 830 BC. Pictures of the boat taken in the Municipal Museum in Albion Street before this was bombed in the Second World War, shows a series of notches along the length

of both sides. These notches are probably remains of holes to fasten washstrakes along the sides, either by wooden rivets in a lapstrake construction or by lashings in a carvel construction. The construction may also have been lashed in a carvel fashion with an outside batten to protect the seam (Tom Sheppard/Hull Museum Collections).

Another extended dugout has been found at Lough Lene in Ireland and is dated to about the birth of Christ. It is extended in the carvel fashion with mortice and tennon and sewn through the tennons. The shape of the dugout part is similar in shape to the Brigg Logboat (OhEailidhe 1992).

An interesting boat-wreck was given to Nordiska Museet in Stockholm in 1890. The boat is a clinker-built “Eke” found in Lake Sommen, built with iron rivets. It has a peculiar type of wing stem with a high prow, which is lashed to the bottom plank and to the upper strake in a very primitive fashion (Nordiska Museet nr. 63418).



**Illustration 19** Profile and sections of the Sommen

Eike, from Eskerød 1956: 66

Exploded view of wing stem

One of the small boats, or tenders, found in the Gokstad ship has what may be termed a wing stem. In this case the stem is hollowed out all the way to receive the strakes independently on both sides. The same type of stem is also used in one of the early Middle Age shipwrecks at Roskilde.



**Illustration 20** Wing stem of Gokstad tender, from Eskerød 1956, page 75

It may be reasonable to assume that skin boats were only used where wood for boatbuilding was unobtainable. In all other areas of maritime culture within the circumpolar region, it seems that wooden boats were preferred. The fact that the planks were sewn or stitched does not necessarily indicate a skin boat tradition, as stitching of wooden implements is known all over the world. When the Siberian Eskimo went to the trouble of extending their dugouts with washstrakes of smeared wattle, it goes a long way to support the theory that wood was preferred over skin if at all available.

The prehistoric boats found in England, Scotland and Scandinavia all have features that could be inherited from even older boats, some going as far back as to the boat constructions of the Stone Age. These details will be used as reference in analyzing the boat figures in the rock art of Alta, in construction stages where they might apply.

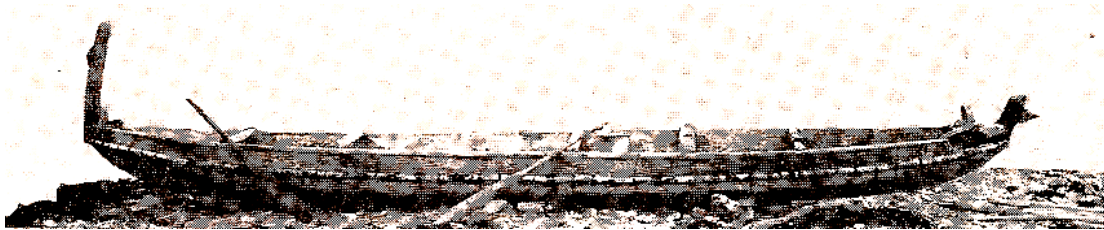
## ***Chapter 4: Boats of Other Cultures***

It is not a coincidence that boat builders from other cultures have solved technical problems in very much the same way they have been solved in ancient Scandinavia. There are certain ways of performing crafts based on experience, which is universal. When we find that boat frames are lashed to clamps left in the hull planks in exactly the same way in the Philippines as in ancient Scandinavia, this was the natural way of performing the task with the access to labor and the tools at hand. It is therefore tempting to compare other handcrafted technical solutions of boatbuilding found in early maritime cultures in other parts of the world, to boat development in Scandinavia.

Few, if anybody, have pointed out the winged stem of the Hjortspring boat as significant in the early development of the Nordic boat (Crumlin-Pedersen: 280). However, in the very few boat-finds in Scandinavia it is the stem which has undergone the most interesting development; a fact that seems to have been overlooked. One of the early problems in boatbuilding must have been to keep the waves from washing over the bow of the boat and to join the washstrakes in the bow in a watertight manner. All maritime cultures have had these problems, and it is interesting to compare some of their solutions.

Some of the people living on the Pacific Islands were the last people to be discovered that still maintained a technology relying on stone tools. Captain James Cook (1728-1779) was the first to map the continent of Australia and the islands of New Zealand on his first voyage in 1768-71. He was also a keen observer of maritime practice. These early cultures had all developed boats for fishing and whaling, mostly based on stone tool technology. A study of these boats might explain some technical solutions and skills common to primitive technology in general, and could be used to understand the Stone Age technology in the north of Norway (Eskeröd 1956: 59).

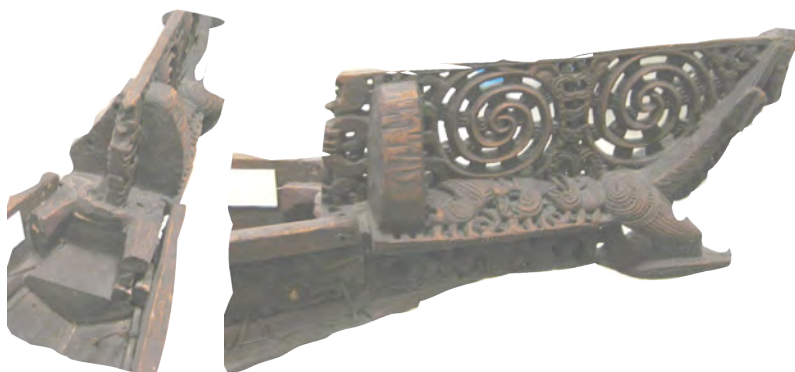
When Cook came to New Zealand, the Maori had a stone tool technology, but produced impressive boats and canoes, all reported in "Volume of Illustrations", a part of Cook's voyage reports. There were three ancient Maori type canoes, also later reported by Elsdon Best: the double canoe, the canoe with outrigger and the large single hull canoe. The large single canoe was used as a war canoe (*waka taua*), and a slightly smaller version was used for fishing (*waka tete*) (Best 1976: 176).



**Illustration 21** The Maori fishing canoe, from Best 1976: 176

Both of these canoes are dugouts finished with one or two washstrakes (rauawa), in the carvel tradition. The canoes are fitted with a relatively low bow figurehead, connecting the washstrakes in a wing stem fashion. Traditionally they are fitted with a very high stern decoration.

The Ethnographic Museum, a section of the Museum of Cultural History (KHM) in Oslo, has a small replica of a canoe similar to the fishing canoe illustrated above (Ill. 21). Details of the bow of this canoe are shown below. The figurehead in the bow has the shape of a wing stem where the washstrake is attached (EM # 878).



**Illustration 22** Details of model from New Zealand, KHM #878, showing the profile of figurehead (right) and bird view of wing structure (left).

Photo by author

In a model of a dugout canoe from New Guinea at the Ethnographic Museum, a wing stem is lashed to the bow, and washstrakes are inserted inside the wing stem on both sides and secured with lashings (EM # 29777b).



**Illustration 23** Wing stem on a canoe from New Guinea, EM #29777b. Photo by author

**Illustration 24** Canoe of Mon type from Solomon Islands at British Museum, from Hornell 1970: Pl XXXI



At British Museum is a canoe of the Mon type from the Solomon Islands, it has clamps left in the planks, tied to the frames in a manner similar to the Hjortspring boat.

In February Captain Cook discovers a new group of islands which he calls “Sandwich Islands” (Hawaii). He describes the islands and their canoes: *“These, in general, are about twenty four feet (7.3 m) long, and have the bottom, for the most part, formed of a single piece of log of wood, hollowed out to the thickness of an inch, or an inch and a half (2.5-3.8 cm), and brought to a point in each end. The sides consist of three boards (on each side), each about an inch (2.5 cm) thick, and neatly fitted (along the sides) and lashed to the bottom part. The extremities, both at head and stern, are a little raised, and both are made sharp, somewhat like a wedge; but they flatten more abruptly; so that two side boards join each other, side by side, for more than a foot (30 cm.). But Mr. Webber’s drawing will explain their construction more accurately than my description in words. As they are not more than fifteen (38 cm) or 18 inches (46 cm) broad, they have outriggers. Some of them have a small triangular sail, like those of the Friendly Islands”* (Cook 1785: 243).





**Illustration 24** Hawaii canoe by John Webber. From Foster 1996: 71

This may or may not be a case of a wing stem attached on top of the dugout and connected with a low washstrake, but an extension of the underlying dugout is clearly visible aft.

From about year 500 BC the Philippine Islands are considered to have a Metal Age (Personal information from Mary Jane Louise A. Bolunia, PhD. Cand. National Museum of the Philippines, e-mail March 24, 2010) (Bolunia 2010).

On the island of Mindanao, near the Masao River, west of Butuan City, nine ancient wooden boats have been discovered. They are given the official name Butuan boats. Of the nine vessels recorded, three (Butuan One, Two and Five) have been excavated by the National Museum and have been preserved. The Butuan Boat One, discovered in 1976, has been radiocarbon dated to AD 320. The Butuan Boat Two is dated to AD 1250, and The Butuan Boat Five to AD 1215. The boats have been documented by Paul Clark, Jeremy Green, Tom Vosmer and Ray Santiago (Clark 1993).

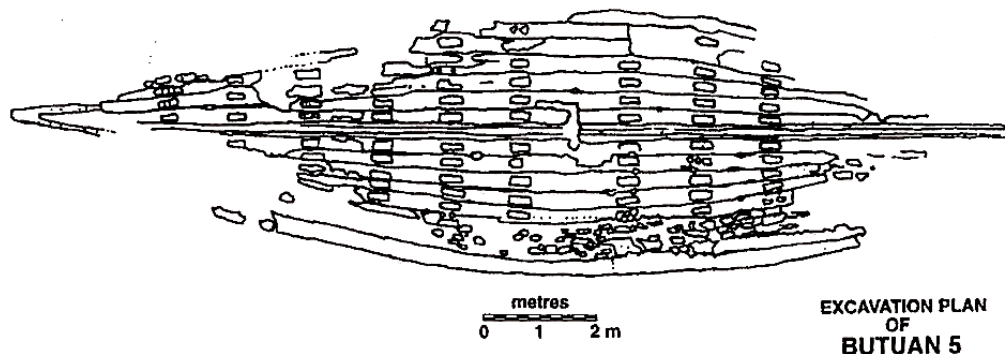
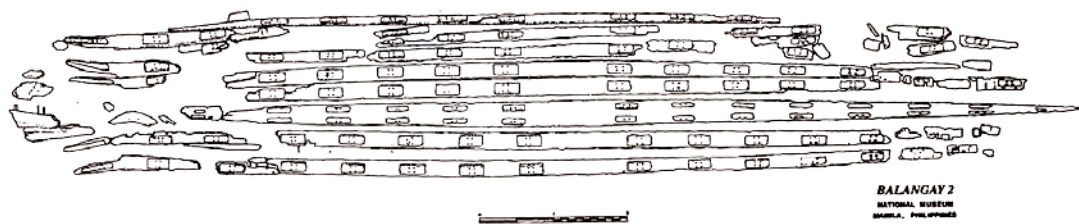


Figure 5. Excavation plan of Butuan Five excavation. (Drawing: National Museum.)

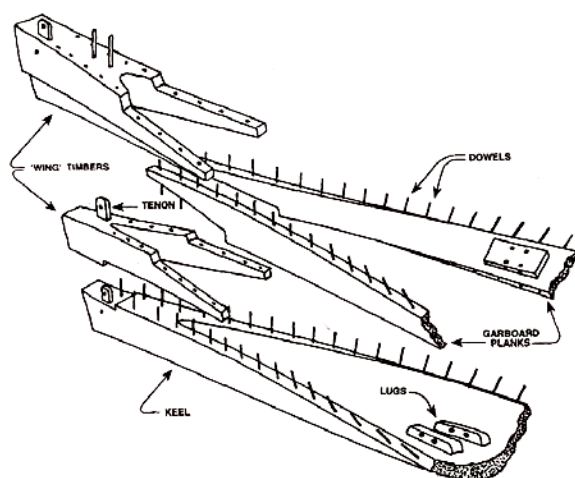
**Illustration 26** Excavation plan of Butuan Boat Five, dated to AD 1215, from Clark 1993: 147. The wing stem is seen on the left



**Illustration 27** Excavation plan of Butuan Boat Two, dated to AD 1250, from Clark 1993: 149

Another interesting feature with these boats is the arrangement of clamps left in the wood of the planks to tie to the frames, in the same way we see in the Hjortspring boat and later boats and ships in Scandinavia as late as the Middle Ages. However, the Butuan Boats are built in carvel fashion with dowels between the planks. They are built with shell first construction, tying in the frames when the planking is nearly complete.

Another and even more interesting feature is the use of a wing stem in the bow, discernible in the excavation drawing for the Butuan Boat Five (far left). This is another construction similar in principle to the the Hjortspring boat.



**Figure 10.** Hypothetical construction arrangement of wing stem and planking on Butuan Two. (Drawing: T. Vosmer.)

**Illustration 28** Hypothetical construction arrangement of the wing stem and garboard strake on Butuan Two, from Clark 1993: 151

Note that the wing stem in this construction is split horizontally to receive the carvel type planking in layers, not like in the Hjortspring boat, where it consists of one block between keel plank and railing with the thin planking sewed on. On the above drawing the clamps left in the planks (here called lugs) to tie in the frames have a slightly different configuration compared to the ones in the Hjortspring boat and later Scandinavian boats.

It is confirmed that building methods and solutions in other remote cultures, many of whom have Stone Age technology, are in many cases similar to the methods and solutions apparent in prehistoric Scandinavian boat building.

The use of clamps, left in the wood of planks for the purpose of tying in the frames as demonstrated in the Hjortspring boat is common, not only in the Metal Age Philippines AD 320, but also in the Solomon Islands as shown in the Mon type canoe at the British Museum.

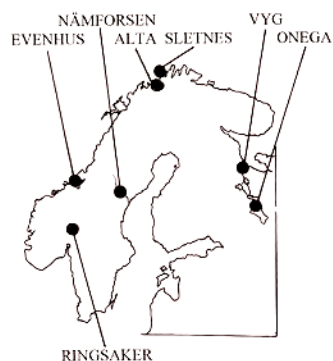
Use of the carvel method to join washstrakes to the top of dugouts is used in the Pacific, and shown in one example in Scotland (Lough Lene). This may well have been the method used in Stone Age Norway.

Use of wing stem has been used in the Pacific in a similar way to the Hjortspring boat and other more recent boats in Scandinavia. This indicates that the use of wing stem also might have been used by the ancestors of the Hjortspring boat.

## ***Chapter 5: Boat figures of hunters and gatherers***

In order to establish a relationship between the boat figures of Alta and similar figures in other parts of northern Scandinavia and Russia, I will include a short description of the figures at Vyg, Lake Onega and Nämforsen. This will show the first Alta carvings in the right context. Carvings from Evenhus and Ringsaker are also included, primarily because they are part of Gjessing's documentation.

Mesolithic and early Neolithic sites are, among others, described at Slettnes in Sørøya, Evenhus in Trøndelag, Nämforsen in Ångermanland, Ringsaker in Hedemark, Lake Onega and River Vyg in Karelia. The "single line" boat carvings are described in Onega and Nämforsen and may be dated (from the contemporary appearance of elk head axes) to before 6000 BP (Lindqvist 1994: 242). The "contour" carved boat figures from Vyg has been dated to (from about) 4300 BC (Gjerde 2009: 53) and to about 4800 BP (Lindqvist 1994: 203). Contour carved boats at Nämforsen have been dated (on the basis of postglacial land lift to 72 meters above sea level (abbreviated asl) to about 4800 BP (Lindqvist 1994: 230), while the contour carved boat figures at Evenhus have been dated to about 3700 BP (Vourc'h 2008: 457). The carvings at Slettnes are dated to about 5800 years BP (from similarity of boat figures in Alta) (Arntsen 2007: 26). Gjessing believes the carvings at Ringsaker to be early Stone Age.



**Illustration 29** Locations of rock carvings by hunters and gatherers, referred to in this chapter

### *Mesolithic carvings in Alta*

The oldest boat figures in Alta are located at the site of Kåfjord about 26 meters above sea level (asl). They are estimated to be about 5800 years old.



**Illustration 30** The above carving, showing a small boat with a reindeer figurehead carved together with a larger elk head, found at Kåfjord at 26 meters asl accessible about 5800 years BP. Photo Karin Tansem, Alta Museum

The figures above are shown together as they are carved on the rock face, but only the left hand figure is listed as a boat figure (nr. 2). The figures at Kåfjord are all reproduced by scanning (Karin Tansem, Alta Museum) and have a smoother outline than most of the other boat figures reproduced in this paper. It is therefore difficult to compare these carvings directly with the oldest boat figures at Bergbukten in Alta, although they are about the same age, located at about 25 meters asl.

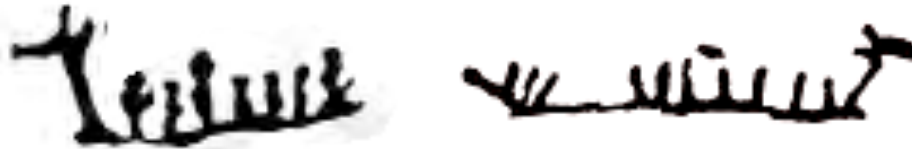


**Illustration 31** Boat figures 1 and 4, from Bergbukten 25 meters asl and from Kåfjord, respectively. Photo Karin Tansem, Alta Museum

The boat figures 1, 2, 3 and 4 are so called “single line” boat figure carvings, and are the only boat figure carvings of this type at this level in Alta. Some slightly similar boat figures are observed at lower levels; they probably depict similar craft in use at a later time, although some of the earlier ones (above 24 meters asl) could conceivably be from before the transgression.

### *Mesolithic carvings at Nämforsen*

At Nämforsen a great many boat figure carvings from apparently different times and with different construction, are carved on the same rock faces. Some of these “single line” boat figures may be compared to the oldest, or first generation boat figures in Alta, and may be from the same time period.



**Illustration 32** Carvings from Nämforsen, believed to be from the Mesolithic period, from Hallström 1960, Pl. XIV-G:2 and Pl. XIII-G:1

### *Mesolithic Carvings at Lake Onega*

Single line boat figures from East Kareliya are slightly different from the ones at Nämforsen, but have the same pronounced elk figureheads. They may therefore be compared to both Alta and Nämforsen figures (Poikalainen 1998: 29 and Lindqvist 1994: 229).



**Illustration 33** Carvings from Lake Onega believed to be from the Mesolithic period. From Poikalainen 1998, page 29 and Hallström 1960, Pl. XXVIII-X:1

Hallstrøm is of the opinion that the boat figures from Onega and Nämforsen have a lot in common, and he believes this is entirely due to a cultural influence (Hallström 1960: 345).



**Illustration 34** Carvings from Lake Onega believed to be from the Mesolithic period, from Raudonikas 1936, table 3. (The figure on the right has a peculiar similarity to the Kåfjord, boat figure 2)

### *Mesolithic carvings at Slettnes*

Stone nr. 4 at Slettnes has two boat figures. Both boats are almost identical with the second generation (my classification) boats in Alta (boat figures 6 and 7). Siegfried Stølting proposes a date between 6000 and 8000 BP (Stølting 1997: 19), while Arntzen compares the figures with similar figures in Alta and proposes a corresponding date i.e. 5000 – 3800 BC (Arntzen 2007: 34).



**Illustration 35** Boat figure on Slettnes stone nr. 4,  
drawing by Jonny Nordhus, from Stølting 1997: 18

### *Carvings at Ringsaker*

On the shores of Lake Mjøsa in Hedmark is a large deposition-block with carvings by hunters and gatherers. A boat figure is discernible and is characterized by Gjessing as a dugout (Gjessing 1941: 88). However, it is interesting to note that the shape is different from the ones at Alta and Nämforsen. Most important the figurehead is missing, and it is difficult to know which end is the forward end.



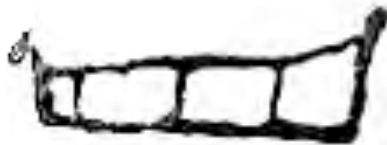
**Illustration 36** Boat figure on deposition-block at  
Ringsaker. Photo by the author

### *Neolithic carvings at Vyg and Nämforsen*

Many of the boat figures carved in Nämforsen and the River Vyg may be from the Neolithic period. Some of these shows a similarity with the Evenhus carvings, while others have many of the same characteristics as the third generation (my classification) boat figures in Alta.



**Illustration 37** Boat figure from Vyg, believed to be from the Neolithic period, from Hallström 1960: 354



**Illustration 38** Boat figure Nämforsen, believed to be from the Neolithic period, from Hallström 1960: Pl. XV

The figure above, from Vyg (ill. 37), may be compared to the third generation Alta carvings, having a protrusion in the bow and a conspicuous figurehead. (The filled in carving may be the result of a different carving style.) The figure from Nämforsen (ill. 38) may in turn be compared to some of the Evenhus boat figures, a view shared by Gustav Hallström (Hallström 1960: 295).

### *Neolithic carvings at Evenhus*

The typical Evenhus figure shown below may be compared to the Nämforsen figures dated to the Neolithic period.



**Illustration 39** Typical boat figure from Evenhus, from Brøgger 1951: 15

Mesolithic and Neolithic carvings depicting boat figures in Russia and Northern Sweden seem to be similar to the Alta carvings. This may support a theory that people in Finnmark originally came from the east, taking with them their boat building skills. The Neolithic figures are also slightly similar to the figures in Evenhus, except for the spur, which is typical for the Vyg and Alta carvings. This difference could be caused by the carving technique.



The difference in figureheads is also interesting. The Vyg and Alta figurehead show elk or reindeer while the Evenhus figureheads are of a different type, by some scholars called bird heads (Gjerde 2007: 60). The boat figure at Ringsaker has no figurehead.

## Chapter 6: Alta

Alta is a community located in Finnmark in the northernmost part of Norway. It is located innermost in the Altafjord, at 70 degrees north and between 23 and 24 degrees east, between the Alta and Eiby rivers to the east and the Mattis River to the west.



Kåfjord Kvenvik

Hjømmeluft

Litlevatn

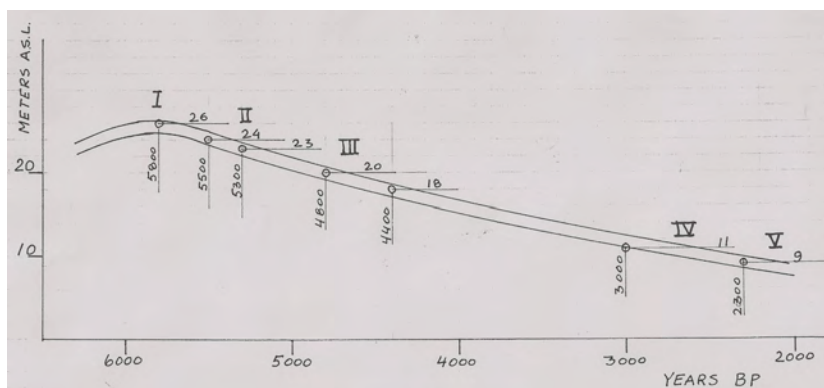
**Illustration 40** Map of the Alta area. The most important sites in connection with this paper being Kåfjord, Kvenvik, Hjømmeluft and Litlevatn lake

Alta is host to the most important collection of rock art in Norway, established as a UNESCO World Heritage site in 1985, and administered by the Alta Museum.

The four most important sites for this paper are in Hjømmeluft with the sites of Bergbukten, Ole Pedersen, Bergheim, Apanes and Apana gård, the privately owned site at Kåfjord, the Kvenvik greenstone formation, which may have been a source for tools and the Litlevatn lake, where pollen specimens were collected in 1977. The Komsa rock constitutes the northern peninsula of Alta. This site gave its name to the Komsa culture referred to in archaeological literature from the region.

### *Postglacial land uplift*

The postglacial land uplift in the Alta region was offset by a rise of the ocean before this reached its maximum about 6000 years ago. Later the land uplift has been steady and close to linear.



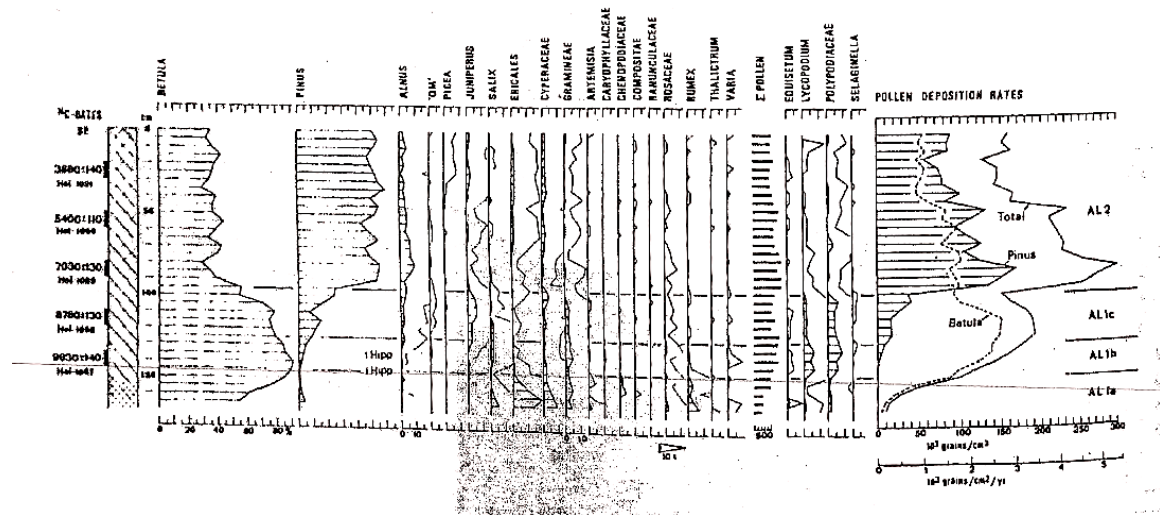
**Illustration 41** Approximate curve of postglacial land uplift, meters versus years BP, uncalibrated

Knut Helskog (1988: 32) has divided the land uplift in four, later revised to five, phases. Marie S. S. Arntzen has revised and calibrated the dates of the phases (Arntzen 2007: 26) using “Sealevel” program version 3.51,1998 and “Oxcal” version 3.10 to calibrate the dates. In my tabulation of boat figures at different levels on page 53, with their approximate dates, I have referred to Helskog’s phases and included Arntzen’s reference levels and her calibrated dates.

In the last 5800 years the land in the Alta region has risen some 26 meters. Between the oldest boat figures carved at about 5800 years BP and the most recent figures carved at about 2300 years BP the land-lift has been about 18 meters, giving an average of about 200 years for every meter of land uplift.

### *Pollen analysis*

In 1977 H. Hyvärinen extracted pollen samples from the small Litlevatn lake to the east of the Alta river. The lake is situated on a bedrock hill in the Alta valley, at an elevation of 188 meters. The site is a few kilometers inside the Main Substage (Younger Dryas) end moraines, and is well above the local marine limit (Hyvärinen 1985).



**Illustration 42** Pollen diagram of the Alta core, from Hyvärinen 1985: 70

According to Hyvärinen, the upper half of the pollen sequence represents a pine forest phase. The local pine invasion, dated to about 7500 years BP, is reflected by a steep rise in pine pollen influx (to more than 2000 grains/cm/year). A trace of spruce is present in the uppermost pollen spectra, but most of the spruce zone, characteristic of Fennoscandia seems to be absent from the pollen and sediment record in Alta. The Alta forest is the largest of the isolated remnant populations that survived in sheltered valleys.

The same general trend in pine invasion is shown further east in Fennoscandia by Heikki Seppä in his article "*Postglacial trends in palynological richness in the northern Fennoscandia tree-line area and their ecological interpretation*" (Seppä 1998).

## ***Chapter 7: Boat Figures in Alta***

Before analyzing the boat figures in Alta, which is my main objective with this paper, I will describe the way I have registered and classified the carvings. The boat figures in Alta appearing in arbitrary sizes in the field, are carved in different directions and most importantly, on several levels of flat rock surfaces.

To show the figures on a common basis I have decided to illustrate all of them in approximately the same size, leaving them in the carved direction (the present convention is to have the bow pointing to the right). They have been illustrated in sequence from the highest elevation down, given numbers from 1 to 80. These numbers will be referred to as “boat figure numbers”, not to be confused with other illustrations in the paper.

What are believed to be crew strokes have been left as originally carved. The human figures have been outlined by me, both to accentuate the tasks performed by the figures, and also to show the outline of the boat figures more clearly. I have only considered the figures from a technical viewpoint and I have disregarded any ceremonial or religious meaning.

In order to analyze the different stages in the development of the carvings, I have grouped the figures on a basis of a preliminary evaluation. The figures change markedly with elevation (and age), and I have therefore classified them in generations according to elevation. From data on postglacial land uplift the elevation in meters above sea level corresponds approximately to an average of 200 calendar years per meter.

The number of years BP registered is when the rock-face in question was above water level and available for carving. The dates are therefore “terminus post quem” meaning the carvings could not have appeared before the date in question. The 80 boat figures registered are carved from the Mesolithic Age or Arctic Stone Age through the Neolithic Age and Bronze Age or early Metal Age in the north to Pre-Roman Iron Age; from not before about 5000 BC to about the birth of Christ.

The assigned generations are chosen as guidance for the analysis, and will denote changes in the carved figures which may have some bearing on changes in boat construction. Most of the figures are distinct and easy to classify, others are difficult to understand, and some figures may have been carved by inexperienced carvers. As a whole, however, the boat figures in Alta reflect a consistent development.

### Chapter 8: Table of Proposed Boat Figure Generations in Alta

The assigned generations I have proposed are based on the particular structure of the boat figure, which reflect the basic design of the boats, and not necessarily the actual carved shape. The BC date corresponding to the different elevations above sea level (asl) are interpreted differently by Helskog (1988: 33), Vourc'h (2008: 39) and Arntzen (2007: 26). I have chosen to use the dates referred to in Arntzen's thesis, and have shown her levels of reference in Alta. These levels correspond fairly well with my levels of elevation.

Boat figure numbers	Assigned generations	Elevation meters asl	Corresp. date BP	Helskog Phases	Arntzen		Comments
					ref. level asl	calibrated BC date	
1 - 4	I	26 - (25)	5800				Mesolithic, Scandinavian-Russian tradition
5 - 11	II A	24	5500	I	26 - 22	5000 - 3800	Characteristic figures, identical to figures at Slettnes
12 - 20	II B	23	5300				Difficult figures to explain
21 - 46	III A	20 - (18)	4800	II	21 - 17	4000 - 2500	Neolithic tradition, subgroups A and B refer to differences in apparent utilization
47 - 61	III B	18	4400	III	17 - 15	3100 - 1800	
62 - 73	IV	11 - 10	3000	IV	12	1700 - 400	Bronze Age tradition
74 - 80	V	9 - 8	2300	V	9	800 BC-AD 300	Iron Age tradition

## Chapter 9:

### Catalogue of Boat figures

Figures are traced from photos taken by Karin Tansem, Alta Museum.

1



2



3



4



5



6



#### **Kåfjord** 26 meters asl

Figures 1 and 2 are probably the oldest pictures of boats in Northern Europe, being about 5.800 years old, belonging to the later Mesolithic period or arctic Stone Age.

They both have the characteristic figure-head, that still is a tradition in the Bronze Age and the Viking Age.

#### **Bergbukten** 25 meters asl

Figures 3 and 4 belong to the typical boat figures we find in Fennoscandina from Lake Onega through Kareliya to Finnmark.

The figures could possibly have been carved before the transgression.

#### **Bergbukten** 24 meters asl

Figures 5 and 6, although from the same general rock plateau, belong to a different type of carving technique where the hull proper is filled in and the silhouette give the impression of a marked sheer.

7

**Bergbukten** 24 meters asl

All the figures 7, 8, 9, 10 and 11 belong to the same type with filled in hull and a marked sheer.

They are all carved in the same general rock plateau.

8



In these figures there appear human figures outlined by me in addition to the crew strokes.

The figures also perform certain tasks.

9

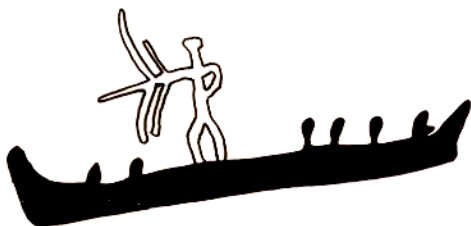


Figure 9 shows plainly a special type of bow and arrow.

10



11



Figure 11 shows clearly the typical sheer in the filled in hull. This figure is the Logo of Alta Museum.



12

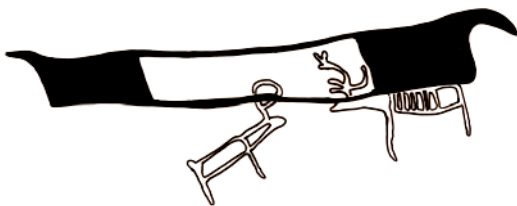
**Ole Pedersen** 24 meters asl

Figure 12 is the first boat figure with an open interior. It also has a flattened profile, and could conceivably remind of an Umiak. The reindeer may be from an earlier carving.

13



Figure 13 is from the same rock plateau but has again a filled in hull and some sheer with a marked figurehead.

14

**Bergheim** 23 meters asl

Figure 14 could from its profile, conceivably be taken as a skin boat.

15



Figure 15 has no special characteristics.

16



Figure 16 could be reminiscent of a Bull-boat.

17

**Kåfjord** 23 meters asl

Figure 17 is shown to be lifted by two men. This might have been to demonstrate the low weight of the boat which therefore could be a skin boat of the Umiak type, from visiting Eskimo. However, it is decorated with the traditional figurehead.

18



19

**Kåfjord** 23 meters asl

Figures 18 and 19 is of the same general type as those at Bergbukten, 24 meters asl.

The boats have a peculiar cargo placed in the forward part of the boat. The nature of this special cargo has not been fully explained.

20

**Ole Pedersen** 23 meters asl

Figure 20 is one of the most detailed figures at this site and shows a bottom line forward that could possibly indicate an attached washstrake.

21

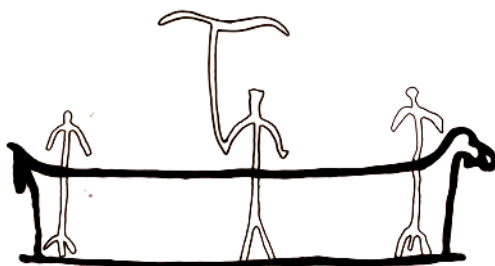
**Bergbukten** 20 meters asl

Figure 21. There is a striking difference between this and earlier carvings. The distinction is the fully drawn out human figures below the railing line, the marked extension of the keel line forward and aft and the vertical stems.

22



Figure 22 from the same level, has the same characteristics, possibly with a reindeer as figurehead.

23



Figure 23 has the same characteristic stern, and a very elaborate elk figurehead.

24



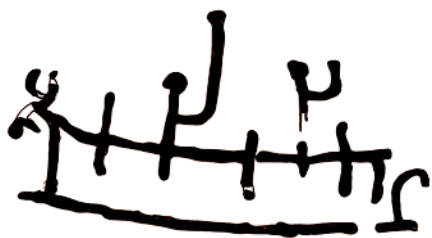
Figure 24 has the characteristic stern and bow extension of the keel, and does also have an elk figurehead.

25



Figure 25 has still by and large the same general characteristics.

26



**Bergheim** 20 meters asl

In figure 26 I have kept the human figures in with solid lines, as in the original. The carving is slightly eroded, but the moose figurhead and the extended keel forward is clearly shown.

27

**Kåfjord** 20 meters asl

In this figure I have also kept the human figures in with solid lines, as in the original. This should therefore not be confused with internal frames, as their heads show above the railing.

28

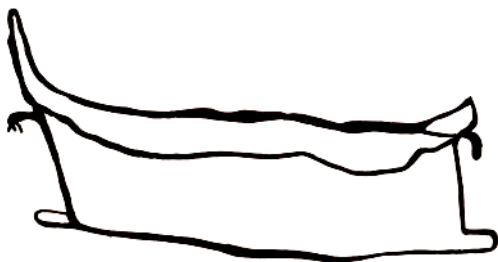


Figure 28 is from the same level in Kåfjord. The bow is assumed to be on the left with a dwarfed figurehead.

This carving shows a very marked bow and stern extension of the keel. It also has a double line along the upper side which could be interpreted as a second strake.

This figure is among the lowest figures in Kåfjord, and could have been added later.

29

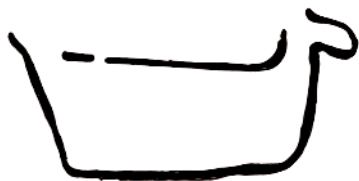
**Kåfjord** 19 meters asl

Figure 29 has none of the earlier characteristics, it is included for the sake of good order.

30

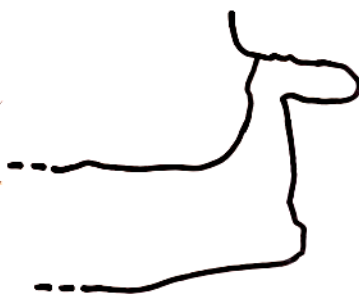
**Apanes** 19 meters asl

Figure 30 is the only figure in this location. It seems to be unfinished, but has a characteristic figurehead and an indication of an extended keel forward.

31

**Bergbukten** 19 meters asl

Figure 31 is a rather crude figure, but it has all the characteristics of the previous figures.

32

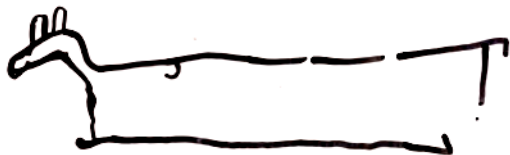


Figure 32 is a similarly crude carving.

33

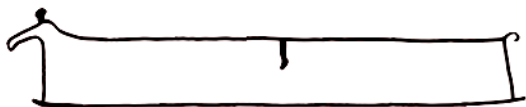


Figure 33 one of the longest figures registered.

34



Figure 34 is a heavily drawn figure with figurehead and extended forefoot. In this carving it is difficult to judge whether the internal lines represent crew or if they are indications of frames.

35



Figure 35 from the same plateau has clear indications of crew symbols which I have left open for illustrational purposes.

36

**Ole Pedersen** 19 meters asl

Figure 36 shows a fairly long boat with a varied crew of eight persons. The figures are shown in outline by me to be able to focus on the boat construction.

It has a pronounced extension of the keel forward and aft and a vertically supported figurehead.

37



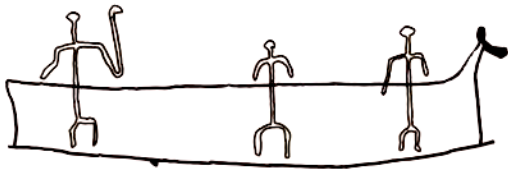
38



39



40



Figures 37, 38 and 39 are sketches, but with the same general characteristics as the earlier carvings.

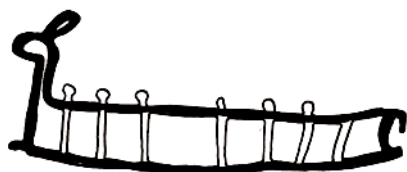
Figure 40 shows a boat with a crew, the crew drawings are shown in outline by me.

41

**Ole Pedersen** 18 meters asl

Figures 41 and 41 B represent the same boat picture, but in 41B I have shown the crew figures in outline only.

41 B



42

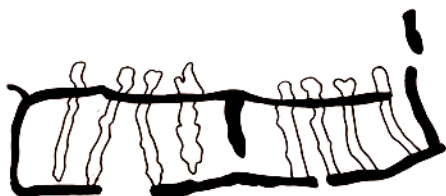


Figures 42 and 43 are probably sketches or may have been carved by inexperienced carvers.

43



44



Figures 44 and 45 also give the impression of being carved by inexperienced carvers, here with crew-strokes that I have shown as outlines only. The heavy line down from the railing in the middle could be a vestige of a frame.



46

**Ole Pedersen** 18 meters asl

Figure 46 is another crudely drawn boat, but it has two interesting features: the long tail and the hooked forefoot.

47

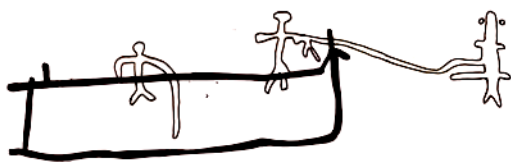
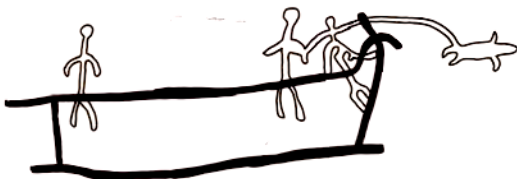


Figure 47 and 48 shows whale catching from a boat for the first time, indicating that the boats may have become larger and more seaworthy.

The people and the whale are shown by me in outline only.

48



49



Figure 49 is another stylized boat-picture with the stern extension missing.

50



Figure 50 is another whale catching scene. The reindeer in the scene is difficult to explain.



51

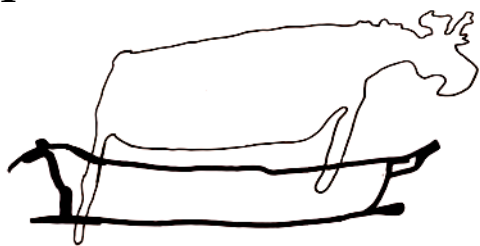
**Ole Pedersen** 18 meters asl

Figure 51 shows a boat with a very flattened figurehead. A large elk is indicated in the boat.

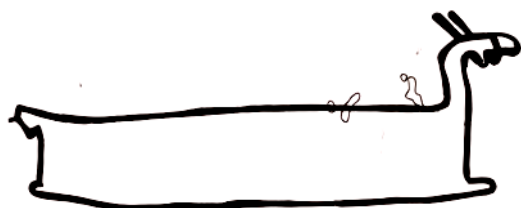
There is a parallel in figure 61, where two reindeer are shown in a very long boat.

52



Figures 52, 53, 54 and 55 are variations of the boat with vertical stems and figurehead and an aft ornament in the form of a tail. They all have extension of the keel forward and aft.

53



54



55



56

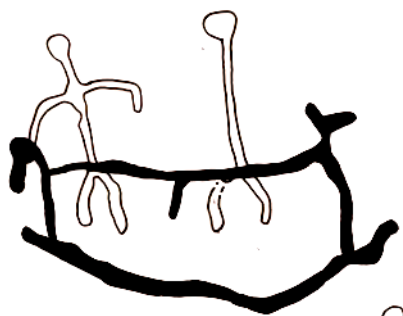
**Ole Pedersen** 18 meters asl

Figure 56 shows the traditional boat with two persons on board. Again a vestige of a frame in the middle.

57

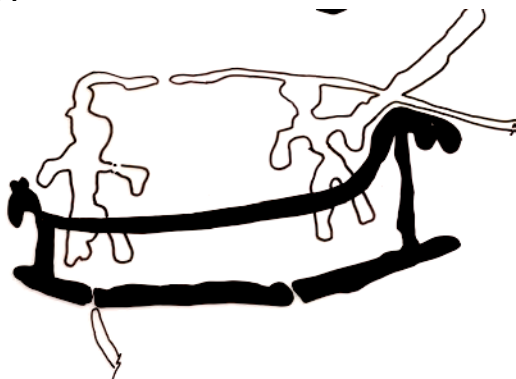


Figure 57 shows a similar boat engaged in whale catching (whale further out to the right).

58

**Bergbukten** 18 meters asl

Figure 58 shows a boat where it is difficult to distinguish between bow and stern. It is also a question if the three figures in the boat are frames or crew.

59



Figure 59 and 60 The figures show a slight difference in the stern from the foregoing figures. However, they do resemble figure 41 in way of the figurehead.

60



61

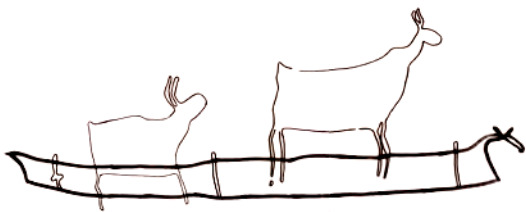
**Bergheim** 18 meters asl

Figure 61 may be compared to figure 51 as large animals are shown in the boat. It may be that they actually ferried tame animals across the water, or the animals may represent slaughtered reindeer. It might also have some mythical meaning (Helskog 1988: 60).

62

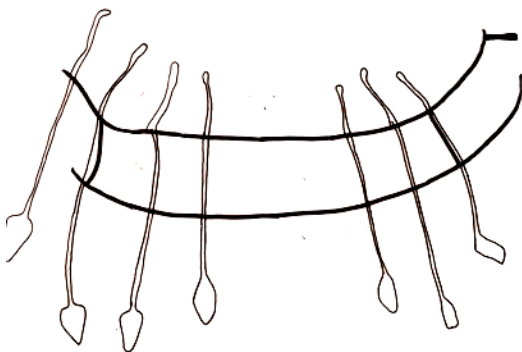
**Apana Gård** 11 meters asl

Figure 62 is the only boat figure where paddles are indicated.

Another interesting aspect of this figure is that the railing line is extended forward to support the figurehead, as opposed to the earlier boat drawings where vertical stem gave the support. Also the keel extension forward seems exaggerated.

63

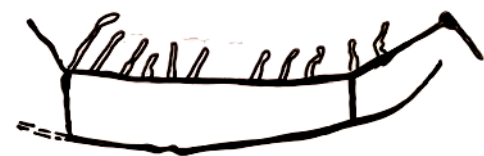


Figure 63, 64 and 65 has the same extension of the railing line forward and aft. Crew strokes are outlined by me. Figure 64 are the only boat figure where human figures are visible inside the boat, and outlined by me.

64



65



66



Figure 66 and 68 continues the tradition of elongated railings and keel, although it is not as apparent as in figure 65, due to the carving technique.

67



Figure 67 shows a hybrid boat with a vertical aft stem that seems to be decorated for some special occasion.

The forward part seems in agreement with the new tradition

68



69



**Apana Gård** 10 meters asl

Figures 69 and 70 shows the elongation of the railing line forward and aft very clearly.

70



71



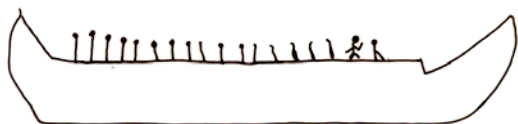
72



73



74



75



76



77



Figures 71, 72 and 73 show different versions of the boats with extended railing.

#### **Apana Gård** 9 meters asl

Figures 74, 75 and 76 show a completely different hull form from the above boats.

The boats are also larger, with up to 34 crew strokes.

Figure 77 shows the same general hull form as above but with a very high stern structure.

78



Figures 78 and 79 show the same contained form, but shows no details, save the reminiscent of an ornament in one end.

79



80



**Apana Gård** 8 meters asl

Figure 80 shows a large boat with room for dancing people.

This boat also has a very high stern structure and in addition an extremely high raised bow.

## ***Chapter 10: Analysis***

### *First Generation Boat Carvings in Alta (Figures 1 - 4)*

The oldest carvings in Alta, which are probably from the Mesolithic period, are also mentioned in my chapter on “Boat figures of Hunters and Gatherers” page 44. They seem to be basically similar throughout the northern areas of Scandinavia and Russia, and there is a consensus of opinion that they depict log boats or dugouts and in some cases floats made up by tying several logs together. This is based on the fact that large forests have existed in these areas, with some trees large enough to make dugouts. In my chapter on “Boats of the Circumpolar Region” page 22 it has also been made plausible that the Stone Age people preferred wooden crafts over skin or bark if suitable material was at hand. Hallstrøm is one scholar who categorically rejects the idea that the boat carvings by the White Sea (Vyg) could be skin boats (Hallstrøm 1960: 353).

Boat figures from the earliest part of the Mesolithic period in Alta are only represented by two small figures at Bergbukten, and two figures at Kåfjord. The figures at Kåfjord (numbers 1 and 2) are carved on a small rock plateau which came out of the water about 26 meters above present sea level, at about 5800 years BP. The figures at Bergbukten (numbers 3 and 4) are carved at about 25 meters above present sea level, and are slightly younger than those at Kåfjord. However, one should not overlook the possibility that all these boat figures could have been carved before the transgression 6500 years BP.

Because they are carved in about the same tradition as the ones in Nämforsen and Karelia, I will regard them as simple dugouts in the same way as the other northern dugouts from the Mesolithic period.

All northern boat figures have one important attribute in common, namely a conspicuous figurehead. This feature is not observed further south, as confirmed in the Stone Age carving by Lake Mjøsa, (ill. 36). To appreciate a development in later constructions, I believe it is important to note the tradition of furnishing the boats with a marked figurehead. In some later constructions the figurehead seems to become an integral part of the prow structure. This is also noted by Gjessing, although the carvings at Evenhus have a slightly different morphology (Gjessing 1936: 130).

*Generation II A Boat Figures in Alta (Figures 5 – 11)*

The group which I have assigned to generation II in Alta, are all carved in the same general area at the Bergbukten site, at about 24 meters above sea level. Only slightly below the figures which I have characterized as belonging to the Mesolithic period. They are given boat figure numbers 5 through 11, and may have been carved some time after 5000 BC. A typical example, number 11, which is also the logo of the Alta Museum, is shown below.



**Boat figure 11**

This group of boat figures is carved in a completely different manner from figures 3 and 4, which have been carved earlier on the same rock face. They have a distinctly outlined hull form. The hull silhouette is filled in by the carver in a manner not unlike the boat carvings at Vyg, (ill. 37). They are reminiscent of the Vyg carvings in that respect, but do not have the characteristic protruding keel line, or “spur” which is the most characteristic feature of the Vyg boats (Hallstrøm 1960: 345). They are all carved with a vertical prow at right angles to the keel line, and have a marked sheer forward and aft, reminiscent of the early northern fishing boats in use several thousand years later. The stern, also with a marked sheer, has an overhanging flair.

We are faced for the first time with a distinct hull form. This hull form has no parallels in rock carvings save two identical figures found at Slettnes on Sørøya, 75 kilometers due north of Alta. The carvings are therefore unique within a very limited geographical region.

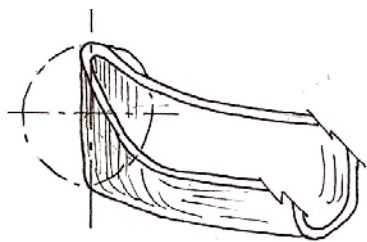
They have all precisely spaced and uniform “crew” strokes. In addition to the crew strokes, the numbers 8 through 11, also have human figures on board performing certain specific tasks (the human figures are shown in outline by me for a clearer perception of the boat).



I believe these figures also represent wooden boats, but the question of skin versus wood could be kept open in connection with these boat figures. Although Alta Museum does exhibit a small skin boat made locally with a slightly similar profile, the silhouette of the boat figures does not look like the Eskimo Umiak, The Eskimo have also been known to prefer wooden boats if they could be made available. As the Alta region could produce large pine trees for their earlier dugouts, I can see no reason that they should discontinue the use of wood for boat building at this stage (Westerdahl 1987: 19).

In contrast to the boat figures of the first generation, where the hull is shown only as a line, they have a marked body. This will not necessarily mean that they have acquired a deeper hull than that obtained in a simple dugout. It could be the result of a different carving tradition. What is more interesting is the marked sheer of the hull, which may be reflected in the construction in several ways. However, although these boat figures are all carved in a consistent manner, they are the figures which has proved to be the most difficult to explain.

It would be possible to achieve the profile by building a dugout utilizing the full diameter of the log in each end. This would leave wood for a sheer line as depicted in the carvings, as the illustration below shows in perspective. With the large tree trunks that probably existed in the Alta region at that time this may be conceivable.



**Illustration 43** Bow section shaped from the full diameter of the log. Sketch by the author

A profile with a slight sheer might have been achieved by spreading the sides after the dugout was hollowed out legume fashion, in the manner of the soft dugout. This would lift the ends and appear as a sheer curve, but there will remain the question of the very straight vertical stems, which is normally not associated with the soft dugout.

Another way of increasing the height of the prow would be to attach a separate piece of wood onto the top of the dugout and secure it with lashings. The piece of wood could be formed as a wing stem and could have a figurehead integrated. The use of a wing stem seems a logical improvement to a dugout as the first drawback to be experienced in a simple dugout would be waves washing over the bow. The tradition of a figurehead could easily lead to the idea of a structure in the bow which could deflect waves from the forward part of the boat.



**Illustration 44** Separate wing stem lashed to bow of dugout. Sketch by the author

This type of construction has been used in primitive boats of the Pacific Ocean as shown in a model from New Guinea at Ethnographic Museum in Oslo (EM # 29777), (ill. 23). The technique is also used in “The Great Canoes” of British Columbia, (ill. 11). Many of the excavated dugouts in Scandinavia and Great Britain have holes in the edge along the forward end. However, as far as I know, no corresponding bow piece has ever been found.

An ‘eike’ type boat, built up from a hollowed out log with one strake, has been found near Lake Sommen in Sweden. This boat, perhaps only a few hundred years old, had a wing stem forward which was attached in a very primitive way with withies (Eskerød 1956: 79), (ill. 18).

Another way of achieving a similar profile would be in a skin boat of a type exhibited at the Alta museum, shown in illustration 45 below. However, the very straight vertical stem of the boat carvings, at a near ninety degree angle to the keel line is difficult to explain, no matter what construction may be visualized.



**Illustration 45** Front part of the exhibited skin boat at the Alta museum. Photo by author

### *Generation II B Boat Figures in Alta (Figures 12 – 20)*

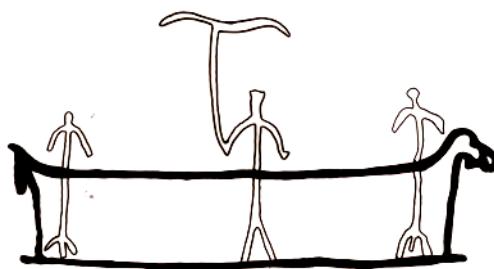
Boat figure numbers 12 through 20 have all been carved at the same level i.e. 24 meters asl down to 23 meters asl, but in some other locations: Ole Pedersen, Bergheim and Kåfjord. These figures have no common features and are difficult to interpret. It seems as though they represent a collection of experimental craft, with no common denominator. Exceptions are number 18 and 19, which belong to a separate group of boat figures in Kåfjord. They have a marked sheer, looking a little like the generation II boat figures. They also have fairly uniform crew strokes, but they seem to have a cargo of some sort, a little forward of midship, which is difficult to understand.

Figures number 12 through 15 have all very little sheer, and their morphology is mutually different. They do not contribute to any understanding of how they might have been constructed. From their silhouette they could conceivably be reminiscent of modern Eskimo Umiaks. Figure 16 could also depict a very short boat (a Bull-boat or coracle) for crossing rivers or similar use.

Figure 20, is one of the most elaborate boat figures in Alta. Carved at about 23 meters asl it is different from all other boat figures. It is carved in a hollow part of the plateau, indicating that it soon became covered with overgrowth. The carving could therefore probably not have been added later. It is characterized by a large reindeer figurehead, 12 uniform crew strokes and a marked tail. It has a distinct line rising above the keel line forward, indicating a structure of some kind. It could be an early indication of a transition to the structures developing some 500 years later, in generation III.

*Generation III A Boat Figures in Alta (Figures 21 – 46)*

It is difficult to see a development other than possibly a wing stem to this next type of stem construction. Boat figure 21 is at an elevation of 20 meters asl, or from about 4000 BC. From this point in time, the figures have a mutually very similar basic construction for almost 2000 years down to the level of 11 meters asl. It is remarkable how the principle of the design is identical in all these carvings, although they appear dissimilar due to the different carving technique and skill of the carver. A typical example of these figures is number 21, shown below.



**Boat figure 21**

The figures are strikingly different from earlier generations of carvings. They are carved in an outline tradition not unlike the figures at Nämforsen and Evenhus. However, they differ markedly from these figures by having a distinct figurehead and tail, a marked extension of the keel line forward and aft, and human figures on board (outlined by me). These are extended into the hull and there is virtually no “traditional” crew strokes, as all figures are shown inside the boat.

The outline of the hull must reflect a basic construction with washstrakes mounted in some way on top of a simple dugout with the ends of the dugout protruding in both ends. A vertical structure may have been used to join the wash strakes forward and aft, and also to carry the figurehead and tail. This could be a plank or a type of wing stem inherited from the previous generation. The protruding keel, or the end of the basic (or underlying) dugout, is shown very distinctly in boat figures 28, 36 and 53. The rest of the figures are simplified and have merely an extended keel line forward and aft as in figure 21.

The extensions forward and aft suggest that the underlying dugout might have been tapered into a pointed bow shape which need to be extended to have strength to receive the vertical structure member. It is not probable that this generation of boats had the bottom part reduced to under the waterline, as this would call for a watertight

seam, and also skewing of the next strake which in itself would be difficult to attach to a vertical structure member forward and aft without a receiving wing stem.

The extent of the washstrake is not detailed in the carvings except in figure 28, (and as mentioned earlier, in figure 20). A construction using one wash strake on top of the basic dugout would only require a simple plank to connect the port and starboard strake, and to carry the figureheads. If a more sophisticated boat shape were intended, using more than one washstrake, a wing stem would be needed to take care of the angle of entry of the planks. However, the carvings gives no clue as to this level of sophistication.

The crew is mostly shown as human figures, but is in some cases merely lines with a “head” shown slightly above the railing line. A few boats are entirely without crew. The figureheads are more or less distinct, and seem for the most part to depict elk (except again for figure 20, which has a distinct reindeer figurehead).

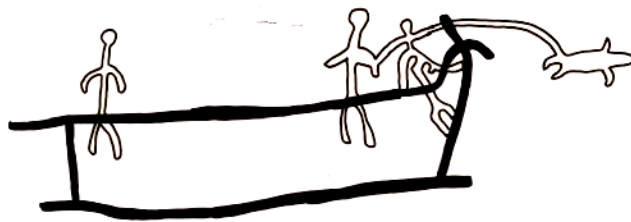
Among the boat figures carved at the site of Vitlycke in Tanum, one carving stands out from all the others. It may be a curiosity, or it may be the key to understand a method of construction. The carving shown below, depicts two men presumably in the process of constructing a plank built boat. In the picture they may be erecting stem posts forward and aft. The stem posts are placed just inside the bow and stern protrusions of the basic underlying dugout.



**Illustration 46** The illustration shows two men presumably in the process of constructing a plank built boat. From the UNESCO world heritage at Vitlycke in Tanum, Sweden. (The persons are shown in outline by me). From a postcard purchased in the souvenir shop at Tanum

### *Generation III B Boat Figures in Alta (Figures 47 – 61)*

I will split this generation on the basis of apparent usage of the boats which may have a bearing on boat size. Boat figure 48 at the Ole Pedersen site 18 meters above sea level is from about 3000 BC. This is one of the first figures depicting a whale hunt, as shown below.



**Boat figure 48** A scene depicting a whale hunt

A similar scene is shown in boat figures 47, 50 and 57. The whaling scenes indicate offshore activity, and presumably the use of a larger and more seaworthy boat than in earlier figures, where the indicated tasks of the crew may be classified as inshore activity. Boat figures 51 and 61 at the same level, both show a boat carrying an elk or a reindeer.

The carrying of elk and reindeer on board may also indicate the need for a larger boat. The animals are depicted standing up, but this may be a standard way of carving animals, and it could well be a transport of slaughtered animals.

#### *Generation IV Boat Figures in Alta (Figures 62 – 73)*

The generation is introduced with boat figure 62 at Apana gård, 11 meters above sea level, estimated at about 1700 BC, or into the early Metal Age in Finnmark. The construction has a clear ancestry to the generation before, but the boat figures show a distinctly different construction. The morphology is especially interesting, as it is reminiscent of the later carvings from the Pre-Roman Iron Age and the Hjortspring type of carvings. A typical example is boat figure 69, shown below.



**Boat figure 69**

The first boat figure in this generation, boat figure 62, is especially interesting although it is not typical for the generation. It is the first and only boat figure in Alta featuring paddles and a steering oar. It can be dated fairly accurately to (not before) 1700 BC. It is carved on a rock face bordering heavy vegetation, and is barely uncovered, indicating that the location was soon overgrown, preventing carving at a

later date. The carving is not deep, but shows clearly six figures with paddles and one figure (aft) with a steering oar.

The similarity, indicating the ancestry with the foregoing generation, is the extended keel line forward and aft and the featuring of a figurehead, although in a different position. The main difference is the extension of the railing line forward and aft carrying the figurehead at the end, as opposed to the vertical stems carrying the figurehead. In this generation it is possible to conceive of a more narrow and submerged underlying component approaching a wide bottom plank tapered in both ends.

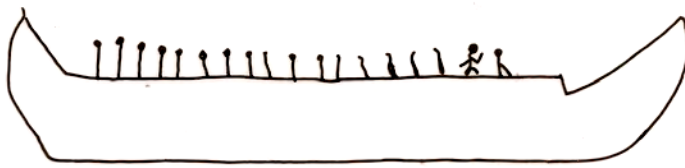
A further explanation of this difference in construction will involve an analysis of the principal structural components in these boats. This analysis will be undertaken in the chapter of the Hjortspring boat. At this point it is sufficient to state that the earlier underlying basic dugout, constituting the main structure of earlier boats, has been modified and possibly streamlined to an extent where it is unable to support the overall structure in a hogging condition (Chapman 1949: 204). To compensate for this, longitudinal structural components have been introduced at railing level. This may have been done by tying long slender and possibly split young trees on top of the railings, and securing these to the vertical structures forward and aft. The necessary extensions of these structural members for tying to the stem structure have then been used to support the figurehead.

Another feature which is different in this generation is the portrayal of human figures. Only one boat figure, namely number 64, shows human figures inside the boat. All other figures in this generation have the conventional crew strokes on top of the railing line.

There is an absence of the typical Bronze Age boat figure in Alta. In some of the figures there are a tendency toward the use of the protruding keel and railing line for a more elaborate ornamentation, but this costume, or artistic fashion, was evidently more established further south.

#### *Generation V Boat Figures in Alta (Figures 74 - 80)*

With generation V, located at elevation 9 and 8 meters asl, we move into the Pre-Roman Iron Age in Alta. The change starts with boat figure 74, shown below.



**Boat figure 74**

The boat figure carvings take once more on an entirely new look. They portray larger boats, with up to 32 crew strokes in figure 75, and could for the first time be classified as ships. At this stage the boats may also for the first time be compared to boats built after the birth of Christ, in which period there is more archaeological material on boats.

In Scandinavia the oldest boat-find is the Hjortspring boat, dated to about 350 BC (Rosenberg 1937). This boat is believed to be among the last descendants of the Bronze Age tradition (Ill. 16).

The Bjørke boat, dated to about AD 320, apart from being a smaller boat, has an entirely different construction of the bow or stern (Humbla 1949). The substantial bottom plank (the remains of the original dugout) is extended with a lashed on type of wing stem, formed into a slight upward angle to receive the one side strake (ill. 17).

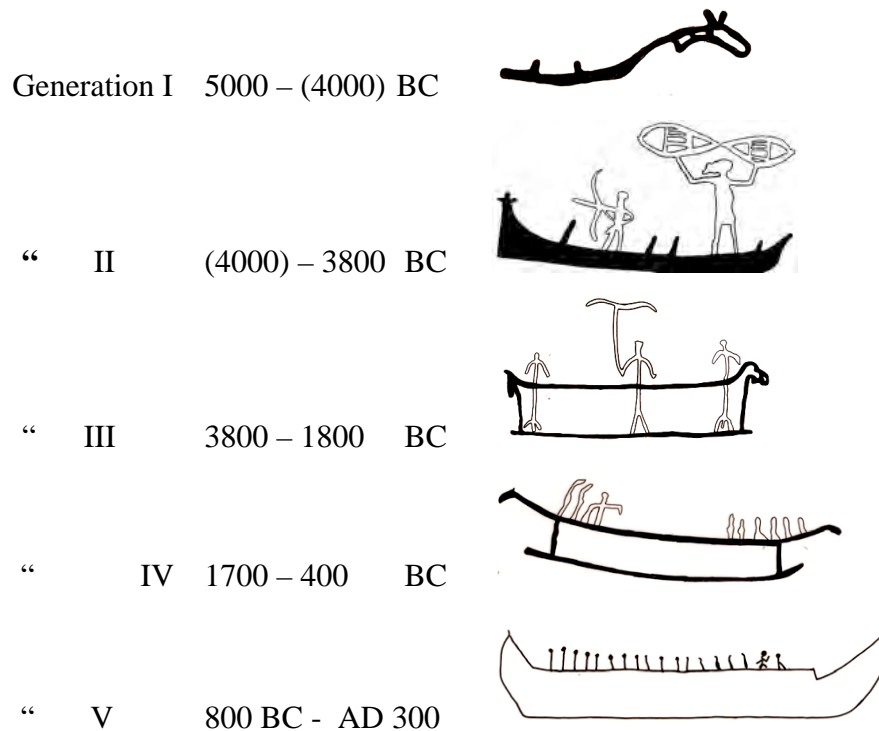
The Halsnøy boat dated to about AD 340 (Schetelig 1903) may have had a similar extension of its bottom plank. (Refer to proposed reconstruction) (ill. 18). This extension has probably been curved upward in the manner of more modern boats.

During the Pre-Roman Iron Age there would have been a development of the wing stem from the Hjortspring type (350 BC) toward the type used in the Gokstad tender in AD 900 (ill. 20), a development that is reflected in the Bjørke boat and in the proposed reconstruction of the Halsnøy boat. This development could explain the curved bow of the boats depicted in boat figures number 74 through 80.

When the traditional Bronze Age ornamentation of the bow and stern came to an end, the boat carvings were apparently simplified by depicting the boats in a nondescript sausage shape, sometimes as in boat figure 79, with a vestige of a figurehead.



The illustration below shows the typical boat figures from Alta in each of my generations, with their calibrated dates, based on the dates proposed by Arntzen (2008).



**Illustration 47** Chronology of boat figures in Alta

The Illustration shows the principal lines of development in the rock carvings in Alta, from the simple dugout of the Mesolithic period, through the Neolithic and Bronze Age periods to the Pre-Roman Iron Age and later.

The structure of the figures in generation III is similar to early figures of the Bronze Age further south in Norway, as in one of the figures from Leirvåg shown below. The figure is characterized by a limited extension of the keel line, the vertical stems and the termination of the railing line at the stems.



**Illustration 48** Boat figure at Leirvåg, similar to generation III, from Mandt 2004: 177

The structure of the figures in generation IV is similar to the Hjortspring boat, but also to other Bronze Age carvings characterized by long extensions of the keel line. Short vertical stems terminating at the railing line and extended railing lines with or without extravagant shapes and ornamentation.

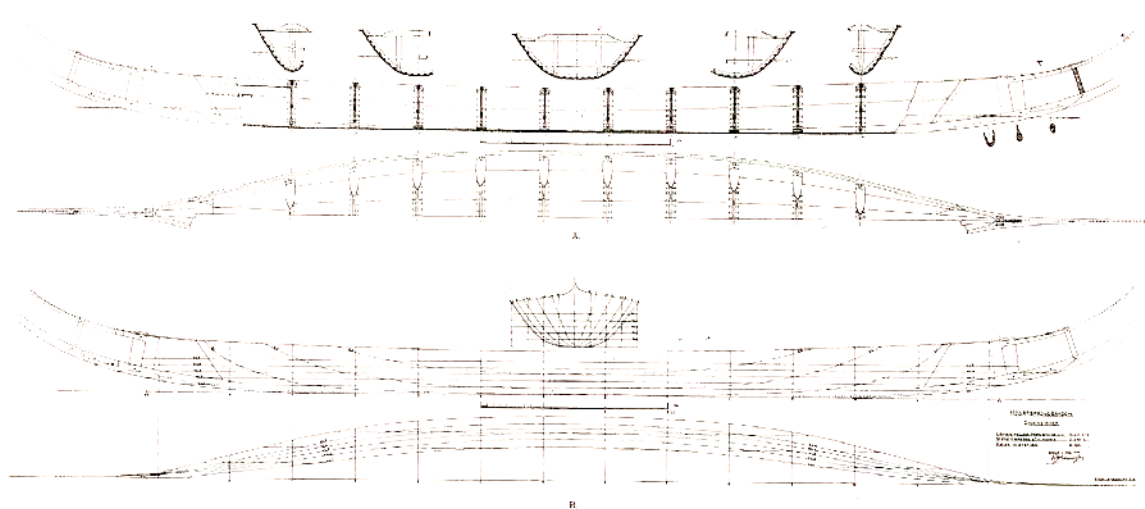


**Illustration 49** Boat figure at Leirvåg, similar to generation IV, from Mandt 2004: 177

## ***Chapter 11: Comments on the Hjortspring Boat***

Usually it is activities and products in the military, either for defense, attack or research, that will lead to innovation and improve technology. This is apparent today in production of the Stealth Fighters and the engagement in Space technology. The Hjortspring boat was in my opinion the result of such an improvement.

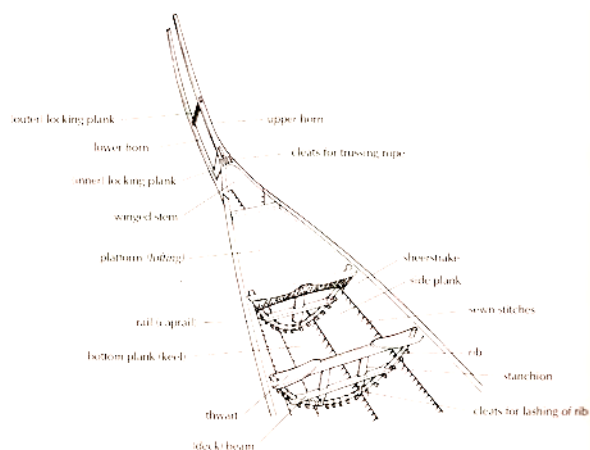
From the find of military equipment in connection with the boat, it is apparent that the Hjortspring boat was a military craft (Rosenberg 1937: 40). No expense had been spared to produce an optimum craft for its purpose. Due to a more structured society with larger communities and a more defensive attitude, more resources would be spent on military craft in comparison to merchant trading vessels. Several communities had possibly contributed to finance the boat (Berntsson 2005: 84). According to Naval Architect Fr. Johannessen who worked out the reconstruction drawings for the boat, I quote (my translation): “...in view of the limited technical facilities and tools available at that time,...the experience, practice and insight in the boatbuilding profession and knowledge of the structural properties of wood commands respect, and is not more developed even today.” (Rosenberg 1937: 92)



**Illustration 50** Reconstruction drawing of the Hjortspring boat, by Fr. Johannessen, from Rosenberg 1937: Pl. II

He goes on to say that everything possible has been done to make the structure as light as possible, without in any way reducing the overall strength. I could add: nor of considering the cost. He praises especially the construction of the integrated structure of seating and frame.

One should therefore not be comparing the Hjortspring boat to the common state of the art in the Pre-Roman Iron Age. The boat is probably as advanced compared to the common contemporary craft, as a Stealth Fighter is to a Piper Cub. However, when this is understood one can notice that many of the principal construction elements must be inherited from older traditional boat building practice, and may point back to the traditional ways of construction. In the Hjortspring boat therefore, several interesting details may be studied with a view to understand their heredity.



**Illustration 51** Details of the Hjortspring boat  
from Crumlin-Pedersen 2003: 280

### *Wing stem*

The wing stem (Crumlin-Pedersen 2003: 280) shown above is an element that may have been refined for use with thin sewed planks in the Hjortspring boat. Originally this type of stem could have lent itself to a carvel construction, and before that, a bow structure on a dugout to fend off waves and make the dugout more seaworthy.

The Butuan boats, described earlier on page 41, show evidence of having been constructed with wing stems. They are built in the carvel fashion with dowels to align the strakes, and with clamps left in the planks to be tied to the frames in the same way as in the Hjortspring boat and later Scandinavian boats. A reconstruction of “Butuan Two” shows the bow construction using two or more wing elements to receive the strakes, being stacked with every other strake (ill. 28) (Clark 1993: 151).

A more primitive version of a wing stem is shown in a model from New Guinea at Ethnographic Museum (EM # 29777 b) (ill. 23). A model of a Maori canoe (EM # 878) also shows a wing stem (ill. 22). A wing stem is also found on a more recent extended dugout (eike) in Sweden (Ill. 19) (Eskerød 1956: 79).

### *Gunwale*

Another feature of construction that may also have been kept on from tradition, without necessarily having a contemporary function, is the gunwale. One of its original functions would be to increase that part of the longitudinal strength which is needed in a hogging condition. In the Hjortspring boat there is evidence that this has been taken care of by introducing tie ropes or trussing ropes between bow and stern at seating level. The use of similar trussing ropes in the later Nydam ship (AD 320) has been suggested (Åkerlund 1963: 45). This has probably been found to save weight over a strong continuous gunwale. The gunwale in the Hjortspring boat is only a reminiscence of the original, and has little longitudinal strength, having weak joints to the upper horn in both ends.

For the sake of clarity, I will elaborate on the question of longitudinal strength. The length of a wooden boat or ship is limited by its longitudinal strength both in sagging condition, when the boat is hanging between two waves, and the hogging condition, when the boat is only supported under the middle (Chapman 1949: Vol I page 201).

In the original dugout the wood left in the log would have enough strength to carry the boat in both sagging and hogging condition. This would also be the case when one washstrake had been added to increase the freeboard. When a second and third washstrake was added, the underlying dugout base was gradually reduced and tapered to obtain slim hull lines. A point was reached when this bottom board could be strong enough in a sagging condition, where it was subjected to strain only, but would not be able to support the hull in a hogging condition.

In such a case a longitudinal reinforcement of the upper part of the hull would be necessary. This could be achieved by installing long slender tree trunks (5 to 6 centimeters in diameter) along the top of the washstrake on both sides securing them at both ends to the stem planks. To prevent transverse collapse they would have to be kept separated with transverse beams or thwarts.

### *Carvel – Lapstrake transition*

Next I will argue that the weight savings inherent in the Hjortspring construction may indirectly be the background for the semi-lapstrake and later the clinker construction method. For this argument I need to assume that boats in Scandinavia from the Bronze Age, like most other primitive crafts found in the Mediterranean and in the Pacific Ocean, were originally built in the carvel fashion. The assumption is logical considering that the washstrake must be joined on top of the dugout forward and aft. In order to save weight the planks in the Hjortspring boat were made extremely thin and wide. The width was to avoid an unnecessary number of joints which could be difficult to make watertight and which also meant a slight extra weight.

In a carvel construction, as the planks get thinner, the contact face of the joint gets narrower. To overcome this the joints in the Hjortspring boat were beveled and then joined in an oblique overlap to obtain the necessary contact face. This could have been the beginning of the lapstrake, or clinker construction that later became the trademark of the Nordic boat type.

### *Bow Locking Plank*

Another construction detail that at first seems to be superfluous, is the bow locking plank (Crumlin-Pedersen 2003: 280) in front of the wing stem. This may be a remnant of the original stem plank suggested by Gjessing (Gjessing 1936: 130). Initially the washstrake may have been joined forward and aft on to a stem plank carrying the figurehead. As the boats became more sophisticated, and the underlying dugout got transferred into a broad tapered bottom plank, the washstrakes were fitted into the stem at a skewed angle. This type of stem did probably not serve its purpose and a wing stem fashioned after the hull lines was introduced to receive the planks. The locking plank may have been kept to stabilize the construction and to receive the longitudinal construction members which later turned into gunwales.

### *Modern Hull Lines*

Finally the Hjortspring boat demonstrates that early naval architects and boat builders had an eye for fairing lines. This is also confirmed in the dugouts of British Columbia, whose slender boats made it possible for paddlers to overtake whales during whale hunts. We have no way of knowing how far back in time boats were fashioned like this. Most of the dugouts that have been found have a very abrupt shape, and must

have been difficult to paddle at high speed, although their length gave them an advantage (Chapman 1949: Vol II page 52).

We may find an indication of the development towards slim lines in the fact that, due to a necessary reduction of the dugout bottom to a tapered bottom plank, it was necessary to strengthen the gunwale with longitudinal construction members. This may be anticipated in the boat carvings, indicated by the protruding railing line, which comes in addition to the protruding keel line.

### *Expanded Dugout*

Several authors have suggested that the Hjortspring boat is based on an expanded or soft dugout. This must be a misunderstanding. I can see no reason to go to the trouble of expanding the relatively narrow and slightly curved bottom plank, any more than to expand the side planks of the same width and curvature. I believe the bottom plank of the Hjortspring boat, with its exaggerated elongated “horn” forward and aft, is a remnant of the original hard dugout, which has shrunk successively through generations of modifications.

### *Skin Boat*

Some scholars have suggested that the Hjortspring boat is developed from the skin boat, and alternative constructions with skin have been proposed (Crumlin-Pedersen 2003: 137ff). One of the difficulties is the protruding horns, which do not seem compatible with skin construction (Hallstrøm 1960: 354).

## ***Chapter 12: Summary and Conclusions***

Among the several thousand rock carvings in Alta there are a little more than 80 boat figures. The figures are located at elevations from 26 to 8 meters above present sea level, and may be divided into five generations of different constructions.

The figures carved at 26 meters asl are estimated to be about 5800 years old. Two figures carved in a plateau about 25 meters asl are assumed to be of about the same age, but could presumably also have been carved before the transgression more than 6000 years ago. The oldest figures seem to be similar to Mesolithic figures in Kareliya and northern Sweden, and could indicate a cultural connection from the East.

The boat figures are remarkably consistent at each level, although a few are difficult to understand and some are carved by inexperienced carvers. The figures are distributed with the four oldest figures in generation I, 16 figures in generation II, 40 figures in generation III, 11 figures in generation IV and seven figures in the last generation V. As a whole, generation III and IV have the more consistent figures, the construction principles of which may be found in most Bronze Age carvings in South Scandinavia.

To be able to get some idea of the construction of the actual boats in use at the time, I have investigated both traditional boats and prehistoric boats produced in the Arctic region. From this it may be reasonable to assume that skin boats were only used where wood for boat building was not obtainable. Maritime cultures within the circumpolar region, seem to have preferred wooden boats. Boats in this region have been constructed in different ways according to what materials were available. In the regions where Gjessing described the boats to be built with planks and sewn in a skin boat tradition, there was access to wood. However, the method of sewing was the obvious way to join the planks, and had nothing to do with a skin boat tradition in these regions.

Many Norwegian scholars seem to believe that the first boats in Northern Scandinavia were skin boats. The theory seems to be based on the misunderstanding that there was a lack of suitable building materials in the north. This makes it easier to understand Gjessing (1936), Brøgger and Shetelig (1952) for their original opinions. However, later scholars have just followed in Brøgger's footprints without reflecting seriously about the question.

I have also investigated boats made in remote cultures in the Pacific, many of which had Stone Age technology. Here I have found many construction details similar



to prehistoric boats in Scandinavia. The use of clamps, left in the planks for the purpose of tying in the frames, as demonstrated in the Hjortspring boat, is common not only in the Metal Age Philippines AD 320, but also in the Solomon Islands. Use of the carvel method to join washstrakes to the top of dugouts is common in New Zealand. This may well have been the method used in the Stone Age in Norway. Use of wing stems have been registered several places in the Pacific, and indicates that the use of this type of stem could have been used also by the ancestors of the Hjortspring boat. The construction details in the Hjortspring boat does give several indications of possible inheritance from earlier boats in Scandinavia.

How then were the boats in Alta constructed, and how was the structural development? There are no undisputed answers, but circumstantial evidence points to some qualified guesses. My conclusion will therefore be stated in the form of proposed assumptions or claims for the different stages of development.

***Claim:** The first boats in the Alta region were simple dugouts, hollowed out from huge local pine trees and furnished with conspicuous elk or reindeer figureheads. The building tradition for these boats seems to come from the East.*

**Argument:** Pollen samples from these regions show a postglacial pine forest invasion from about 7500 years BP. Surviving large pine trees in the Alta region measures more than one meter in diameter. Rock carvings from Lake Onega and Nämforsen, dated to the Mesolithic period, show boat figures with a close relationship to the earliest boat figures in Alta. From sources along the circumpolar region it is shown that wood, if it was obtainable, was the preferred material for boats.

***Claim:** The traditional figurehead configuration could have constituted, or may have been developed into, a stem structure to protect the forward part of the boat from waves.*

**Argument:** Later boat figures in Alta and Slettnes (generation II) show a development toward a high stem with a sharply dropping sheer curve. This may point to a deliberate construction, adding material to the support of the traditional figurehead to better the seaworthiness of the boats. Constructions may be compared to boats in the Pacific, built with Stone Age technology.

***Claim:** The next development could be the addition of a washstrake covering the whole length of the boat. This washstrake will have been attached on top of the dugout in a carvel fashion. This may also be the*

*first use of a wing stem with a figurehead. The construction may have survived in principle until the early Bronze Age.*

**Argument:** The two most conspicuous attributes of the next boat figures (generation III) is the protruding “spur” of the keel line as pointed out by Hallstøm (1960), and vertical stem posts forward and aft as proposed by Gjessing (1936). The protrusion shown would be the underlying original dugout extending forward and aft of the vertical stem posts. This may also indicate a sharpening of the bow of the dugout, requiring added material in the form of an elongation to receive and secure the stem post, and/or a wing stem similar to the one from New Guinea. Carvel construction is compatible with the washstrake attached on top of the dugout, leaving the extensions forward and aft (a lapstrake construction would require the washstrake to come together forward and aft of the dugout ends, with no extension showing).

*Claim: A further development could be to reduce and submerge the underlying dugout, and to add another strake.*

**Argument:** Nothing in the boat figure carvings indicates directly such a development, but the whaling scene in the carvings suggests a larger and a faster boat. This would imply sharper lines, as in the whaling canoes of the north west coast of America, requiring in turn the underlying dugout to be pointed and reduced in weight.

*Claim: The next clearly indicated development, is the need of a reconsideration of the longitudinal strength of the boat. Assuming that the underlying dugout is now reduced to a keel plank not unlike the keel plank of the Hjortspring boat, a strengthening of the upper structures of the boat is necessary, and thus the longitudinal railing structure is introduced.*

*Changing the position of the figurehead may account for the elongation of the railing structure, which later became the fashion.*

**Argument:** This development is indicated by the reversal of the stem structures (generation IV). The vertical stem posts are terminated at the railing, and the figureheads are moved from the top of the stem post to the ends of the extended railing line. The tradition of having a figurehead would be strong in the Northern regions, and even after its function as a wave breaker was past they found another conspicuous place to put it, by extending the railing structure. The sober way in which the extension of the keel plank and the railing line is portrayed in the boat figure carvings in Alta may imply that the first boats were being built that way. Later the fashion of extravagant ornamentation could have developed further south in

Scandinavia. On the other hand, the carvers portraying boats in connection with religious ceremonies in the Bronze Age, may also have been responsible for these elaborated fashions.

***Claim:** There is a possibility that the extension of the keel plank could influence the speed of the boat, not unlike the bulbous bow of modern ships.*

**Argument:** This has already been investigated in connection with trials of the “Tilia Alsie” (a reconstruction of the Hjortspring boat). However, the investigating procedures are not scientifically acceptable, and should be repeated in a model tank.

***Claim:** Boat figures carved in Alta, from about 1700 BC, correspond in principle to Bronze Age carvings further south, and the actual boats depicted could be quite similar to all the later boats in that era. They would be built carvel fashion, but be similar in principle to the Hjortspring boat.*

**Argument:** There is virtually no difference between these carvings save some of the extreme ornamentation of the horns and railings. The principal boat structure with sewn planking, lashed frames and the underlying dugout more or less reduced to a broad extended keel plank, is unchanged. The construction elements of the railing extended forward and aft are decorated according to fashion. The wing stem to receive the side planks is inserted between the keel and the railing, and stabilized with a short locking plank.

***Claim:** Due to extreme measures of weight saving during the construction of the Hjortspring boat, the carvel construction was modified to an oblique joint between the strakes, later developed into the lapstrake or clinker construction.*

**Argument:** A carvel construction believed to have been the method to extend the sides of a dugout needs a certain thickness of the plank to have a large enough contact face. When the thickness of the planks are reduced to save weight, this was solved by using an oblique joint.

***Claim:** The wing stem construction was predominant until a different stem was developed through trial and error, ending up in the “modern” stem we know from the Nydam ship dated at about AD 320.*

**Argument:** Very few boat wrecks are found with their stems intact between the discovery of the Hjortspring boat (350 BC) and the boats from Halsnøy and

Bjørke (AD 320-340). In about AD 320 the Nydam ship, also a very advanced military vessel, had finally acquired a modern type stem.

The boat figures carved in Alta are clearly differentiated in five groups or generations. The actual development of the boats they depict was probably a more continuous process. This process could have started by enlarging the support of the figurehead to a wave breaker, then to a wing stem incorporating the figurehead, then by adding a wash strake aft of the wing stem. As water tightness of the seams were improved, the underlying original dugout would gradually become submerged and smaller. This made the structure as a whole weaker and additional strength was needed in way of the railing.

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