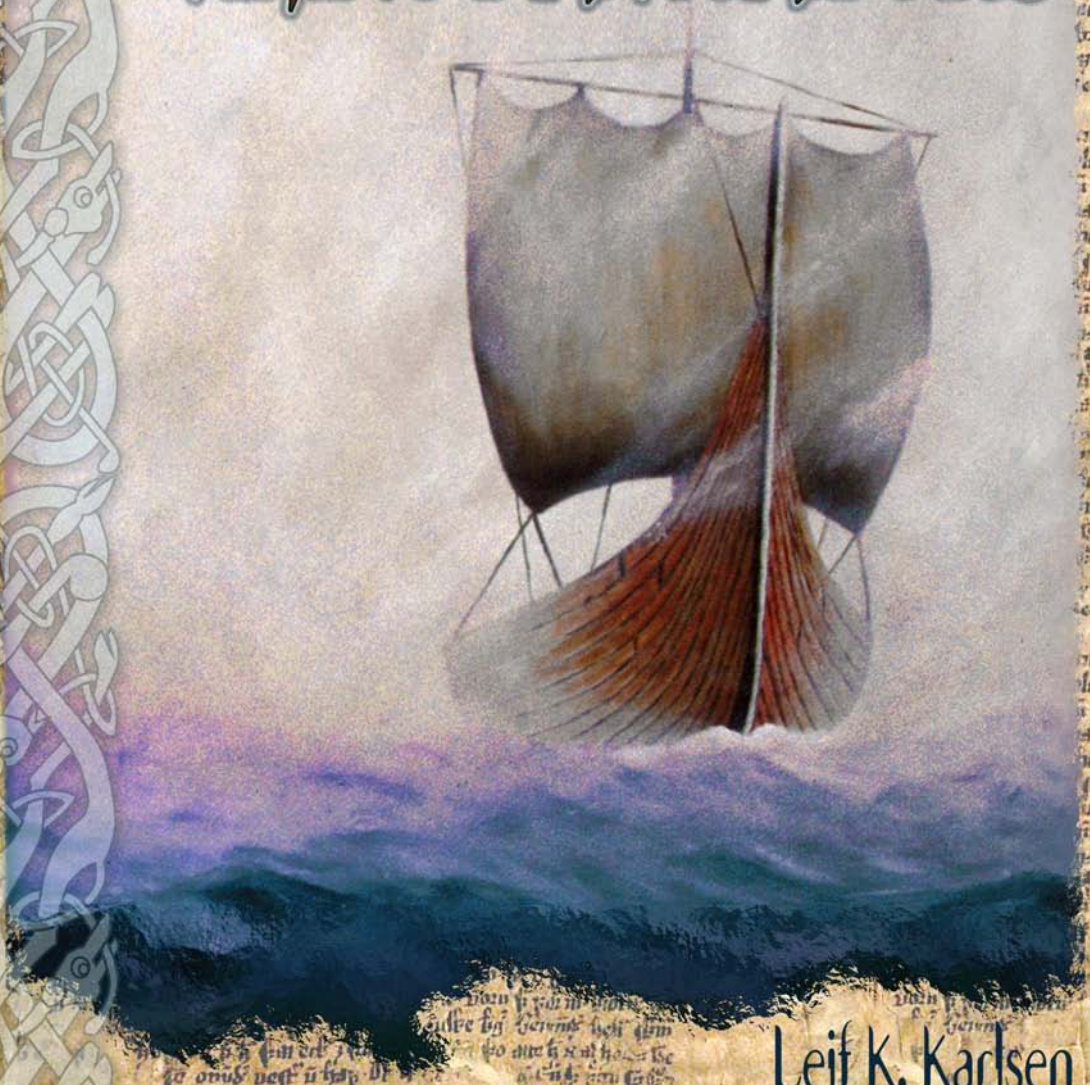
Secrets of the VIKING NAVIGATORS



Leif K. Karlsen

How the Vikings used their amazing sunstones and other techniques to cross the open ocean

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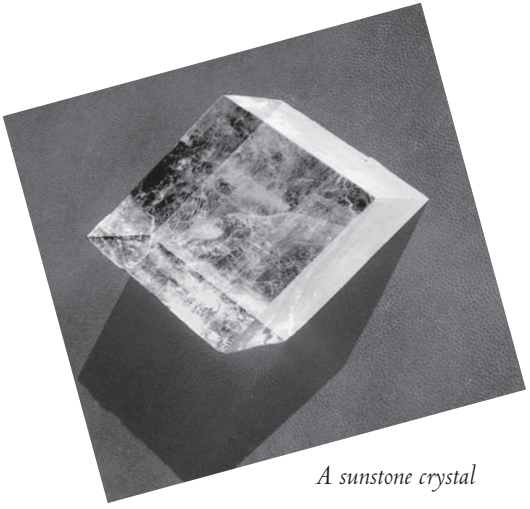

A sunstone crystal

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Secrets of the Viking Navigators
How the Vikings used their amazing sunstones
and other techniques to cross the open ocean

Leif K. Karlsen

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Gísli Arason and Ólafur Vilhjámsson, Höfn, Iceland

David Burch, PhD, Director of Starpath School of Navigation, Seattle, Washington, USA

Dr. Arne Emil Christensen, PhD, Director, Vikingships Museum, Bygdøy, Norway

Sea Captain Laurence Gellerman, Northwest Seaport, Seattle, Washington, USA

Drs. Sveinn Jakobsson and Aevar Petersen, Icelandic Institute of Natural History, Reykjavik, Iceland

Colin McDaniels, Seattle, Washington, USA

Commander Ólafur V. Sigurdsson, Icelandic Coast Guard, Iceland

Sea Captain Søren Thirslund, Maritime Museum, Kronberg, Denmark

INTRODUCTION

Over one thousand years ago, in open, hand-built wooden ships powered by massive, hand-loomed sails, the Vikings navigated the challenging waters of the North Atlantic. This was during the "Viking Age," approximately from the year 800 to the year 1050, when the Vikings of Norway were Europe's most renowned sailors. Their explorations first reached the Shetland Islands and the Faeroe Islands, then Iceland, then Greenland, and, finally, the shores of the North American continent. How the Vikings managed to navigate these vast distances, time and time again, without sextant, magnetic compass, charts, or even an accurate timepiece, is the subject of this book.

I have used the original Viking sagas as a beginning reference guide. These sagas were ancient stories, first handed down orally from generation to generation, and not written down by scholars until the thirteenth and early fourteenth centuries. According to these sagas, the Vikings used whales, swells, birds, the stars and the wind as clues to aid in navigation. Keep in mind that the scholars writing these descriptions were not navigators. I am convinced that the Vikings also employed techniques and devices, born of necessity and their ingenuity, that did not get described in the sagas.

I believe one of the unknown navigational aids used by the Viking navigators was the Solarsteinn or "sunstone." Sunstones, clear crystals found predominantly in Iceland, are often mentioned in the sagas as prized possessions, ranked on a par with a fine stud horse as an indicator of wealth. My research has convinced me that the Vikings used these naturally-occurring crystals to locate the position of the sun when the sun was completely obscured by the frequent fog and low clouds typical in the North Atlantic.

In a natural world that is filled with rare and exquisite examples of incredible uniqueness, sunstones defy the rational

mind. Sunstones are roughly the shape of a three-dimensional parallelogram. All sunstones, without exception, have the same geometric shape and same angularity. Take a large sunstone and break it into smaller pieces and you will have pieces with the exact same angles and geometry as the original. Additionally, every face of the stone has a tilt of 11.5 degrees. The geometry of this unique crystal and how it is used as a navigational aid will be examined in detail later on in this book.

Without knowing the precise time of day, it is impossible to determine longitudinal position. Longitudes are the earth's north-south axes. So the Vikings navigated only by latitudes (the east-west axes) and, in doing so, reached their chosen destinations with surprising accuracy. Following a more or less straight line east or west is called "latitude sailing" and this was the technique employed by the Vikings.

The latitudes at which the Vikings sailed and many of the places the Vikings settled correspond with the latitudes (declinations) of four "zenith stars" in the Big Dipper as they appeared in the year 1000. Included in the book are charts of the principal navigational stars as they appeared a millennium ago. Steering by the stars was also an important navigation method, as was the "shadow pin" technique of finding true north when the sun was available. These are also discussed.

The book begins with a narrative that will give the reader the opportunity to share an open ocean passage with a Viking merchant seaman and his crew. Their conversations and observations serve to introduce the secrets of Viking navigation.

Leif K. Karlsen, Port Orchard, Washington, USA

PART ONE

A PASSAGE TO ICELAND ON AN ORIGINAL KNARR VIKING SHIP IN THE YEAR 988

The history of the Vikings is linked to their mastery of the sea. Ships were the basis of all Viking activity: war, trade, or exploration. This is the story of a voyage as might have been, told by a young Viking merchant seaman, on his first passage from his home in Norway to Iceland.

Chapter One

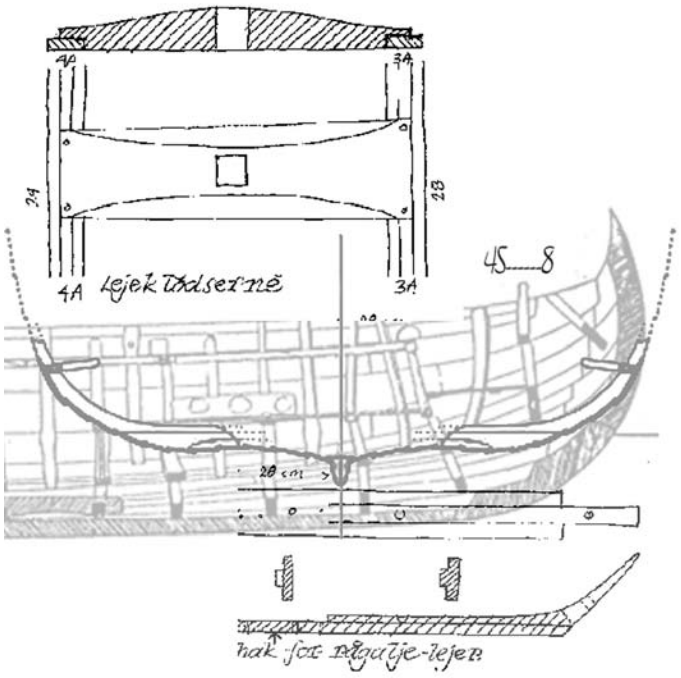
I become the owner of my own ship

My name is Hákon Leifursson. I have just completed the first passage from my homeland to Iceland on my own ship. I've made the passage ten times on my father's ship since I was fifteen, but this time on my own ship I made the passage. But let me start at the beginning and tell you the story.

My father is a merchant and trader who still sails his own ship from our home port of Trondheim, Norway. He is well respected and knows the sea better than anyone else I know. He taught me so much for the past ten years that my head is full of his voice saying, "Do this if this happens—do that if the wind changes." We came back to our home port of Trondheim from a very successful voyage to Iceland in the late summer of last year, number 987. He told me then he had decided this was a good time for me to have my own ship because I had learned all he could teach me, and he could tell that I was ready to be independent. I was happy to have his blessing to be the captain of my own ship.

I went to the boatbuilders in Sunndalen who had been building ships for generations and had a reputation for building strong ships of the best quality. Both my father and some of our best friends had their ships built there. I talked things over with the boatbuilder Sverre Sunndalen. We decided that they should build for me a *hafship*, a seagoing vessel called a *knarr*.

The ship was to be built for cargo and seaworthiness, and to be a good heavy-weather sailer. It would have an open cargo hold amidships with decking at both ends, but with little protection for the people onboard. The *knarr* would also be fitted with two sets of oars fore and aft, mainly to be used for rowing in and out



We measured and laid out the hull.

of the harbors. Since I wanted to expand on the size of my father's ship, I asked them if they could make my ship even larger. They said they could; it would be the largest ship they had built in Sunndalen.

And so my ship was started in Sunndalen. This is where the finest trees for boatbuilding are to be found. The timber was selected by Sverre Sunndalen using trees from his own farm. I talked with the boatbuilders and discussed whether to use oak or pine for the planking. They decided to use pine, both for lightness and for flexibility on a ship of this large size. Tall pine trees with straight grain and without low branches were used for the planking. The trees were split for the planking using wedges, and then carefully shaped with axes and scraping tools. As they were finished, the planks were stored under water to keep them green and workable until they were needed.

The frames and curved pieces of the ship were formed by following the grain of specially selected trunks and crooked limbs of oak trees. These were trees where the burden of winter snow and ice had bent the trunks and limbs into natural curves. Pieces with the right curves were carefully selected. This made for pieces of greater strength, which were easier to finish to curved shapes

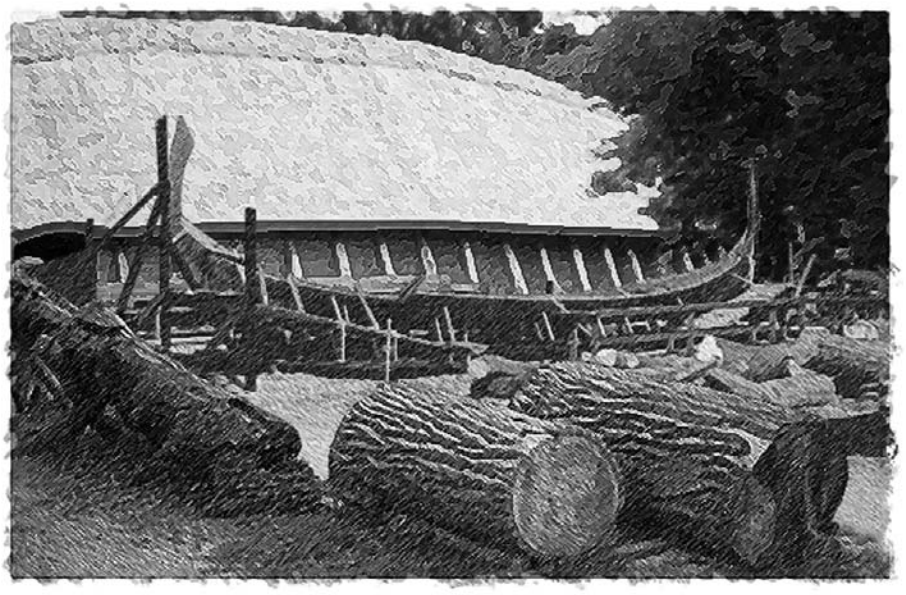
than if they were bent from straight-grained wood. The curved fore-and-aft stems were carved from a single piece of oak from an old bent trunk. The keelson, keel, and frames were also made out of oak. All of these pieces were carefully shaped by hand.

Old, bent branches were used for curved parts.

We chose pine planking for lightness and flexibility for the hull.

We measured and laid out the lengths for the hull. The *knarr* would be *beamy*, a very strong ship, 54 feet long, with a 15 foot beam, and an extra high freeboard. Height amidships was to be 6 feet. There were 12 planks on each side, with the widest being about 20 inches.

The keel was laid last autumn. After a busy winter the boat-builder and his two sons had the *knarr* hull built and ready for launching in the early spring. I watched and eagerly helped as it was taking shape, and I learned many things about my ship by watching as it was being constructed. I learned how before the overlapping planks were riveted together, a string of wool is soaked in pine tar and placed between the planks to keep the hull watertight. I often picked up the tools to get the feel of how to shape the wood. Sunndalen's son showed me how to use the adz and broadax, so that now I can replace a section of wood if it gets damaged.



Boatbuilding yard at Sunndalen.

The side rudder used for steering was mounted on the starboard quarter aft by a rope through the upper planking and pivoted on a boss lower down, about halfway down between the upper planking and the keel. The steering oar is controlled by an *athwartship* tiller.

The *knarr's* hull was a masterpiece, sitting there with several fresh thin coats of pine-tar on the outside. All in all, I could see it was going to be a beautiful ship.

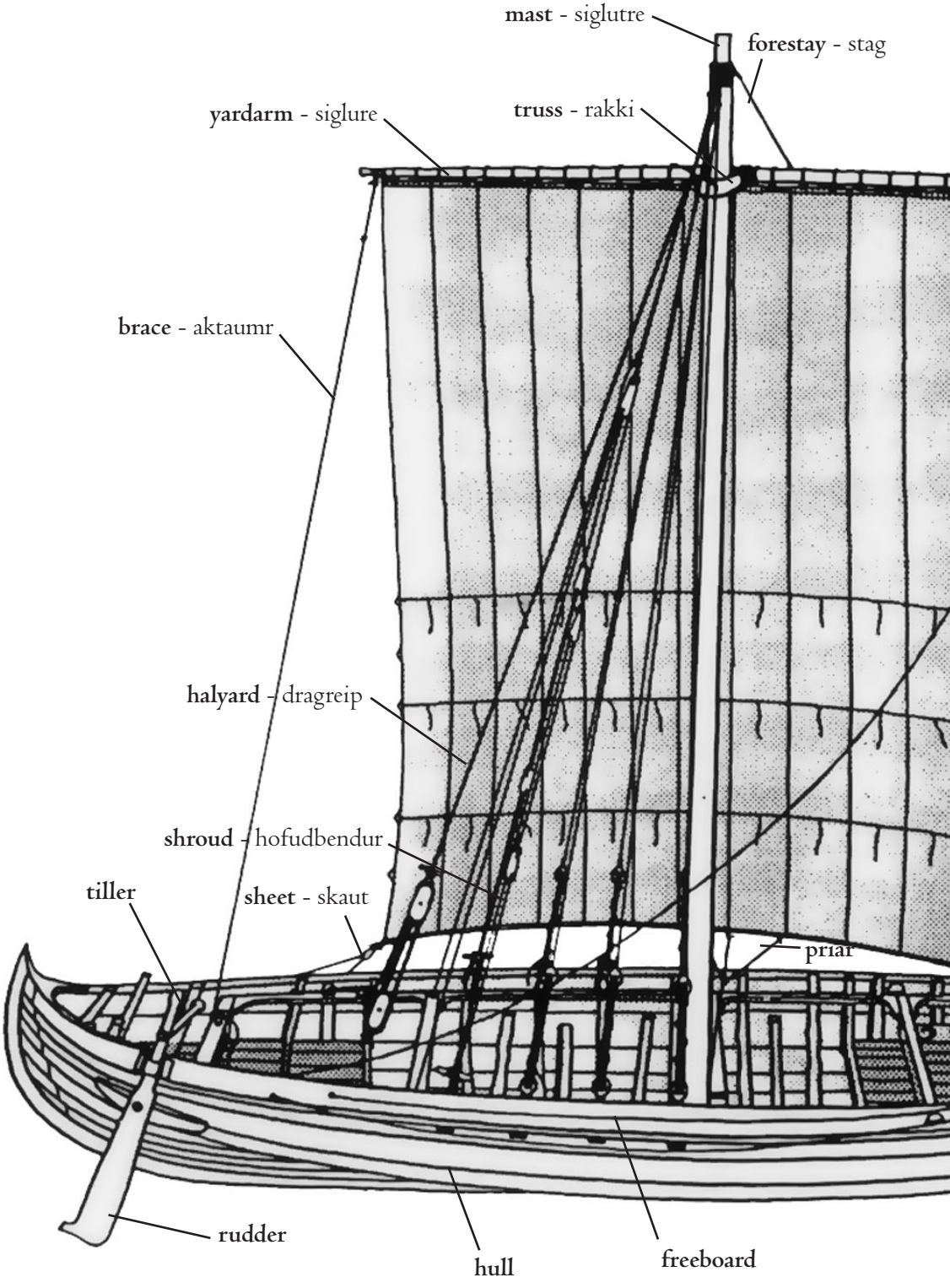
Since Sverre Sunndalen's farm is located inland several miles from the fjord, we had to transport the vessel on a special wagon pulled by horses down to the fjord where it was launched. People from near and far came to see the launching of the biggest vessel ever built in Sunndalen.

After the launching, the ship was named after the national bird of Iceland: the Geirfálki (Gyrfalcon). She was now ready to be rigged and outfitted for her first voyage to Iceland.

The *siglutre* (mast) was made of pine, 42 feet high. All the lines were attached to the mast before it was raised. The mast was *stepped* (raised) and the yardarm fitted, held to the mast by a *rakki*, a piece of wood shaped like a horseshoe used to keep the yardarm close to the mast. The standing rigging was kept simple, with a forestay to the bow, the backstay to double as a halyard to hoist and lower sail. The *shrouds*—four on each side of the mast—were fastened to the frames.

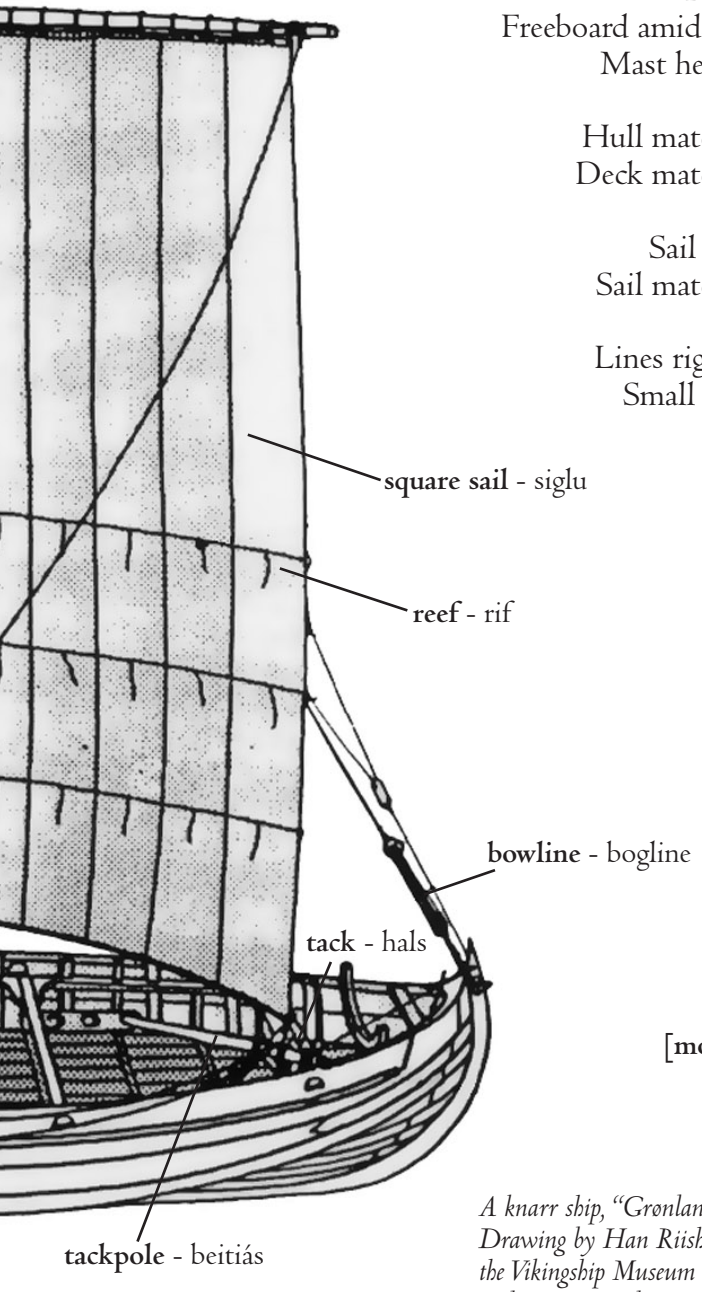
I purchased the finest *siglu* (square sail) to be had from a sailmaker in Trondheim who imports *wadmal*, the best sail making material available, from Iceland. *Wadmal* is made from specially selected sheep's wool, using the long outer hairs of the fleece for strength and durability. The lanolin is left in the fleece. The wool is spun and tightly woven into long strips, which are then sewn together and oiled to make the sail windtight and water resistant. The total area for my sail was about 120 square yards.

The lines for the rigging are all made of tarred hemp. The smaller lines are made from horsehair. After several hours of rigging and pulling lines, the sail was securely attached to the yardarm, and finally the ship was ready to sail.


mast - siglutre
forestay - stag
yardarm - siglure
truss - rakki
brace - aktaumr
halyard - dragreip
shroud - hofudbendur
tiller
sheet - skaut
priar
rudder
hull
freeboard

Materials and Dimensions of "Geirfalki"

Length:	54 feet
Beam:	15 feet
Freeboard amidship:	6 feet
Mast height:	42 feet
Hull material:	Pine planking
Deck material:	Pine boards
Sail area:	120 sq. yards
Sail material:	Wadmal
Lines rigging	Tarred hemp
Small lines	Horsehair



[**modern english -** old Norse]

A knarr ship, "Grønlandsknarren" (The Greenlandsknarr). Drawing by Han Riisbede with kind permission from the Vikingship Museum in Roskilde, Denmark. The vessel and rigging are discussed in Chapter 10.

"I name you 'Geirfálki'—may you be as fast as the bird you are named for."