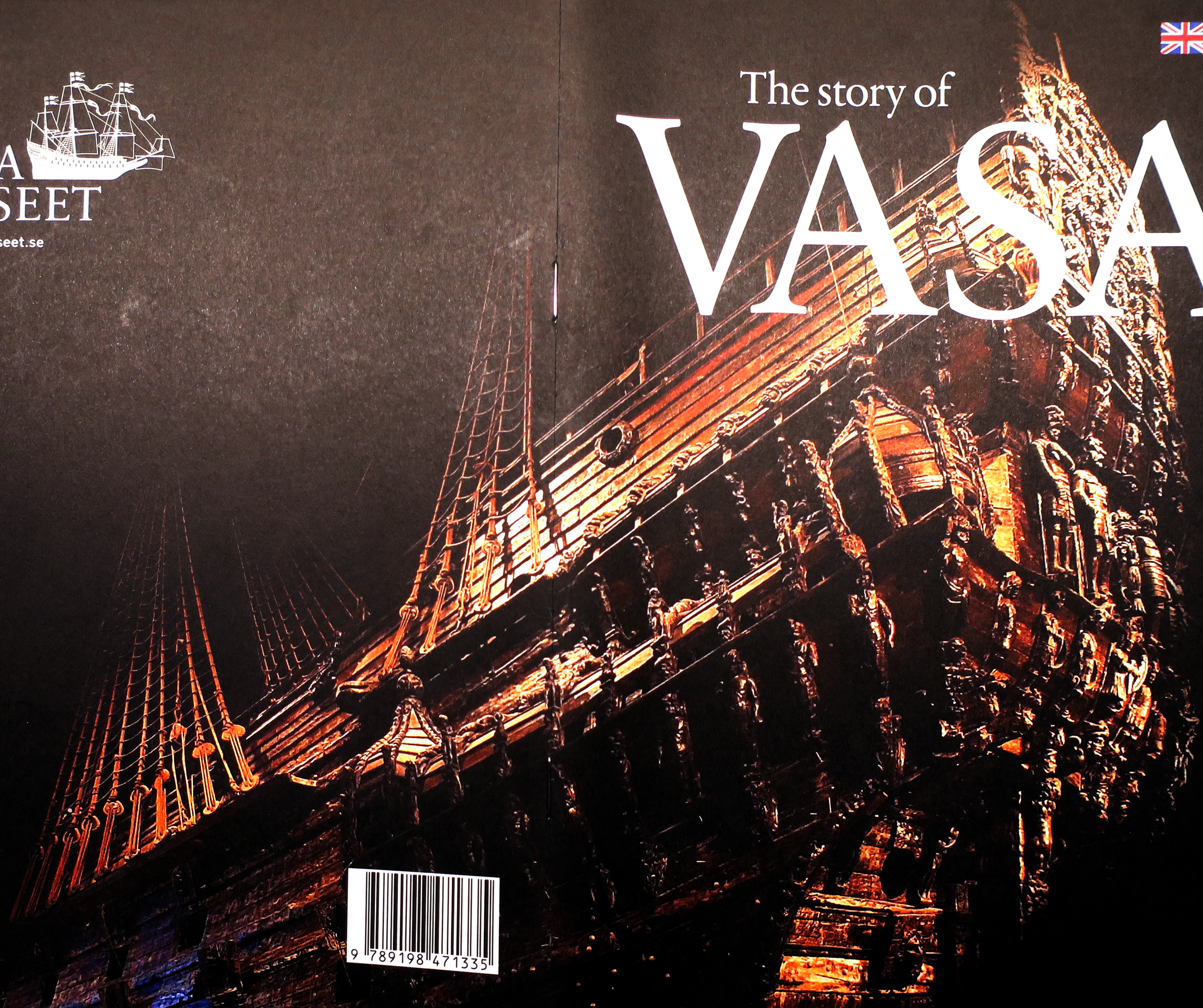
VASA MUSEET

www.vasamuseet.se

The story of VASA



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10 AUGUST 1628

Home port disaster

Vasa, pride of the Swedish Navy, never completed her maiden voyage. But her story lives on.

THE SUMMER WAS NEARLY OVER. Vasa, the Swedish navy's latest ship, should have sailed for the summer fleet base at Älvsnabben months before, but the foundry was very late delivering the ship's new guns. There were also concerns that the ship was not seaworthy. The king had written several times to Vice Admiral Klas Fleming to encourage him to get the ship under way. Vasa had to get to sea before the campaigning season was over. At Älvsnabben, the ship would collect the soldiers who made up two-thirds of the crew and await further orders, to sail to Gdańsk or Stralsund. She was now carrying just mariners, as well as some of their families; the navy allowed crew to bring their wives aboard when the ship was in home waters.

On the afternoon of Sunday, 10 August 1628, the ship cast off from its mooring below the royal palace and was towed along the waterfront into a light southerly breeze. The gunports were open, the guns were run out, and a salute was fired. Four sails were set: the fore course and topsail, the main topsail and the mizzen. The light breeze was barely sufficient to fill them, and the ship moved eastward along the bluffs to the south.

At first she drifted on the current, but then a gust filled the sails and the ship heeled to port, suspended there for a second before slowly righting herself. Many on board must have held their breaths, and the experienced seamen must have exchanged worried looks – the ship should not roll so dramatically in such a light breeze. Vice Admiral Erik Jönsson ran below decks to make sure the cannons were secure. It would be disastrous if one or more should come loose and begin rolling about the deck.

As the ship passed the island of Beckholmen, barely 1,300 metres from where the sails were set, a gap ☞

in the bluffs allowed a stronger gust to heel the ship so far over to port that the gunports on the lower deck were plunged into the water. The sea streamed in, forcing the port side even further down. The people on the upper deck held on where they could while the ship heeled even more, and everyone below deck made for the nearest ladders in the hope of getting up and out. Captain Söfring Hansson gave the order to close the gunports and let fly the sheets to spill the wind from the sails, but it was too late – Vasa was doomed.

She sank barely 120 metres from land. When she came to rest on the seabed, the tops of the masts were still visible above the water, giving non-swimmers something to cling to until boats could rescue them. The death toll was thus surprisingly small, only 30 or so of the more than 150 on board. Most of the dead had been trapped below deck. Among them was Captain Hans Jonsson, one of the navy's most experienced officers and a friend of the king. Erik Jönsson was hit by a hatch cover as he tried to climb out of the gun-decks, but he managed to escape.

Vasa's captains

There were two captains on board when Vasa sailed. Hans Jonsson was an experienced mariner and had commanded many ships over the previous twenty years. He had been named Vasa's captain, but in the summer of 1628 he was replaced by Söfring Hansson, a Dane who had come into Swedish service in 1602. Hans Jonsson died when the ship sank, and his skeleton was probably one of those discovered during the excavation. Söfring Hansson returned to his post at the navy yard and held a few short-term sea commands before he was promoted to holmmajor, similar to a rear admiral in charge of the navy yard.



Captain Hans Jonsson died when Vasa sank.



1. This is where Vasa was built. **2.** Vasa was moved to the quay below the Royal Castle in the early summer of 1628. **3.** On 10 August 1628, Vasa was warped to Tranbodarna (present-day Slussen) and set sail. **4.** Vasa's route. **5.** After 1,300 metres, the wind increased and Vasa capsized and sank.



Admiral Klas Fleming – partly responsible for the sinking

In the summer of 1628, a stability test was arranged for Vasa while she was moored at the quayside. Admiral Klas Fleming was present. Thirty men ran back and forth across the deck and the ship rolled alarmingly. The Admiral had the demonstration stopped, afraid that the ship would sink at the quayside. He did nothing to stop the ship departing after the stability test, although it was within his power to do so.

Why did Vasa sink?

There were no mathematical tools for calculating a ship's stability in the 17th century; ships were built on the basis of prior experience. If the ship embodied new ideas, such as Vasa's unitary armament on two gundecks, the ship could only be built and then tested.

We know now that the underwater shape of the ship and its distribution of weight should create a righting moment, a force rotating the ship back to the upright position when wind or waves heel it over. If the hull shape does not provide enough additional buoyancy when the ship heels, or if there is too much weight high up, the righting moment is not enough to guarantee that the ship will right itself.

The shape of Vasa's hull is typical of its time, if a little on the narrow side, but the heavy and tall construction of the gundecks means that their weight, plus the weight of the guns, is too far above the waterline. When the ship heeled under a light breeze, it had barely enough righting moment to regain its balance. If the gunports had been closed, the water would not have come in and Vasa may not have sunk that day – but she would never have been particularly seaworthy.

> "... and when they emerged into the bay at Tegelviken, the sails were filled with more wind and the ship began to heel very hard to port, but she righted herself slightly once or twice until she came to Blekholmen [present-day island of Beckholmen], where she capsized, water came in through the gunports and she slowly sank to the bottom, sails and flags flying, even though the topsail sheets had been started. Many boats came to the rescue immediately, but nothing could be done to help."
>
> **From the Royal Council's letter to Gustav II Adolf, 12 August 1628**

Vasa's return

After 333 years on the seabed and some unique salvage work, the ship was raised to the surface in a highly publicised lifting operation, to great international acclaim.

FLAGS FLUTTERED IN the spring breeze and the sun shone on the thousands of spectators standing on the heights surrounding the recovery fleet in Kastellholmsviken. The radio was broadcasting live, and TV cameras were aimed at the mirror-like water between the lifting pontoons Oden and Frigg, burdened with the weight of the sunken ship suspended between them. At 9:03 came a ripple on the water, then a black timber rose slowly from the surface. This was the upper end of a frame, the first part of Vasa to see the light of day in 332 years and 247 days. It was followed by the upper ends of knightheads, their faces turned towards the sun.

Vasa continued to rise slowly from the water. Now the pontoons were assisted in their task by huge pumps let down into the ship. Soon Anders Franzén and Per Edvin Fälting, the men responsible for finding and raising the ship, could clamber on board to the cheers of the public.

Several days later Vasa, still suspended between Oden and Frigg, was towed to the large dry dock on Beckholmen. The route passed directly over the spot where the ship was lost on 10 August 1628. The critical moment came as the collection of vessels approached the gates of the dock: the ship had to pass through the narrow gates on its own.

THE LIFTING CABLES were carefully slackened until it was clear that they were no longer under any load, and the ship was afloat. The pumps were going flat out, but it was still something of a miracle that after three centuries, Vasa was a ship again, listing heavily to port, but on her own keel. The ship was drawn slowly into the dock, where she was placed on a specially built pontoon on the bottom of the dock. The ship was carefully righted as the water was pumped out of the dock, until she stood high and dry. The main recovery phase of Vasa's history was complete.





After 333 years, Vasa appears above the surface of the water on the morning of 24 April 1961. Press, radio and TV representatives from all over the world were there to capture this unique event.

Three centuries under water

After a number of trials over the years, Vasa was finally raised in 1961. She turned out to be a maritime archaeological treasure.

VASA LAY ON the seabed in Stockholm harbour for 333 years. Thousands of people sailed over the wreck without knowing what was below them, but the ship was never completely forgotten. Attempts to raise the ship began within days of her sinking, but she was stuck too firmly for the methods of the time to be any use in raising her. It was possible to roll the ship, so that she stood upright on the seabed and would not break down unevenly over the coming centuries.

A series of attempts to raise the ship failed, until entrepreneurs in the 1660s arrived with a different approach. Albrecht von Treileben was granted a privilege in 1663 that allowed him to keep whatever he could salvage from the ship, and he focused on the ship's valuable guns. He had introduced the diving bell to Sweden in 1658, and in 1663 he partnered with engineer Andreas Peckell, who had developed special tools for working underwater; these tools allowed their project to succeed where others had failed.

They managed to recover at least 55 guns and exported almost all of them for sale in Germany – the navies of Great Britain, the Netherlands and Denmark were possible customers. A final gun was raised in 1683, leaving behind the three guns that are now in the Vasa Museum.

In 1844, Anton Fahnehjelm tested a newly invented diving suit in Stockholm and claimed to have walked on the deck of Vasa in it. A major diving operation on the wreck took place in 1895–1896, and in 1920 historian Nils Ahnlund wrote a newspaper article about the chances of finding and salvaging the wreck, while the Olschanski Salvage and Diving Company applied for permission to recover guns and timber from it. The harbourmaster was reluctant to have a diving float moored in the shipping channel, and permission was denied.

Many years later, Ahnlund's article inspired a young Anders Franzén to look for the wreck. He became the last in a long line of people trying to recover the wreck, and the only one to succeed.

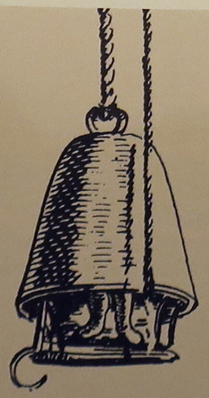
Using original archive materials dating back to the 17th century, Franzén gradually narrowed his search in the summers of ☞



One of Vasa's 64 guns, placed in its carriage.

von Treileben's diving bell

If you plunge an upside-down glass into water, the air trapped inside the glass keeps water out. A diving bell is based on the same principle. The diver stands on a platform so that his head is in the air bubble and he can breathe. With Vasa, everything was completely dark at depths in excess of 30 metres in the harbour, so the diver had to work by feel, and the cold was so intense that he could only stay down for 15 minutes at a time.



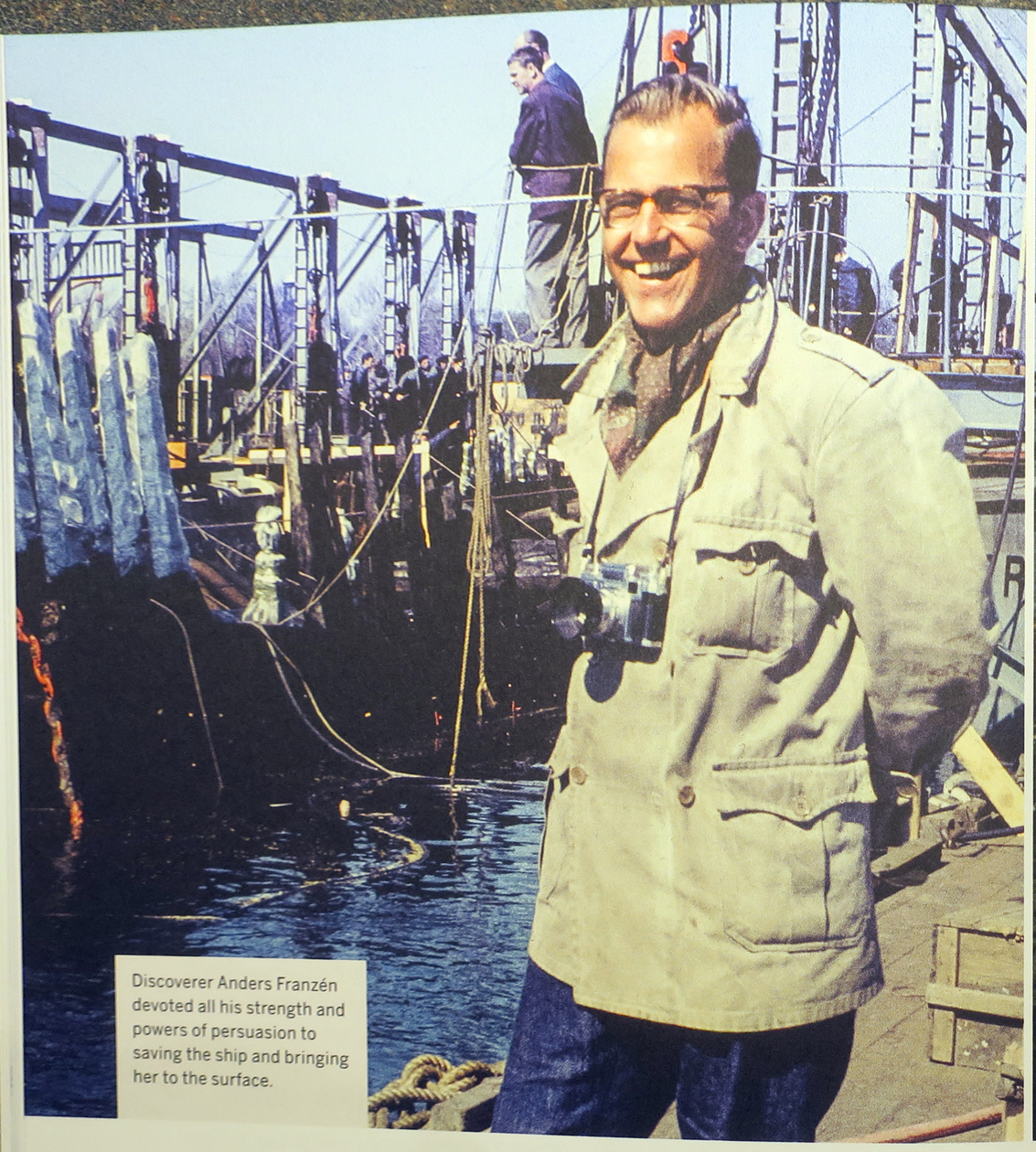
Italian priest Francesco Negri was an eyewitness to the diving work done on Vasa in the 1660s and described the use of the diving bell in his account of his travels, even providing an illustration.



Anders Franzén (1918 – 1993)

When Anders Franzén was young, he was fascinated by tales of the many shipwrecks around Dalarö in the Stockholm archipelago, where his family had a summer house. He worked as a fuels and lubricant expert after studying at the Royal Institute of Technology, but his real passion was always research into the shipwrecks of the 16th and 17th centuries.

The identification of the location of Vasa in 1956 made him a celebrity, and the raising of her in 1961 was his great triumph. Later on, he spent much of his time travelling the world to tell people the Vasa story. He later became a researcher at the Royal Institute of Technology and went on to find other famous wrecks.



Discoverer Anders Franzén devoted all his strength and powers of persuasion to saving the ship and bringing her to the surface.



Chief diver Per Edvin Fälting sits in front, surrounded by Sven-Olof Nyberg, Stig Friberg, Lennart Carlbom and Ragnar Jansson.

☞ 1954–1956. Towing a small anchor, he looked for obstructions on the seabed in the harbour. On 25 August 1956, as he and diver Per Edvin Fälting were searching just in front of Beckholmen, they snagged a large object. A core sampler revealed it was made of waterlogged oak. Two weeks later, Fälting dived on the spot, 32 metres deep, and discovered a large wooden ship with two rows of gunports – Vasa had been found.

Franzén was the first to see Vasa's potential as a museum artefact. If the proposed project of 1920 had succeeded, the ship would have been dynamited for its timber.

Anders Franzén thought the ship should be raised. It was an ideal wreck, lying just a few hundred metres from the navy's diving school, and in excellent condition, free of the shipworms that destroy ships in warmer, saltier waters. Vasa was also an archaeological wonder that could open up a whole new world for modern museum visitors.

But raising Vasa would be a complicated and expensive project. No one had ever succeeded in recovering so large an ancient ship from such deep water. Franzén convinced the navy to provide the diving expertise, the Swedish National Maritime Museum to contribute its historical knowledge, the Swedish National Heritage Board to deal with conservation and the Broströms shipping firm to assign its salvage company, Neptune, to the task.

IN 1957, DIVERS began digging tunnels beneath the ship for the lifting cables. The water was full of sediment, and visibility was near zero. Lights were useless in the tunnels under the ship, full of swirling mud, and the divers worked in total darkness. This was dangerous work as no one knew whether the ship would collapse and crush the divers, but the ship held together and no one was injured. The first of hundreds of carved sculptures and many small finds came to light when the tunnels were being dug. By the summer of 1959, after two years of gruelling work in the cold and dark, six tunnels had been completed. Now it was time to raise Vasa.

☞

Per Edvin Fälting (1911 – 1995)

Chief diver Per Edvin Fälting became a national symbol of the salvage operation. He was the man who first established that the obstruction found with Franzén's drag was a large, old ship. As Franzén's close colleague and the leader of the diving operation, he was a key figure in the project.

Diorama in the Vasa Museum of a diver starting to dig one of the tunnels under the ship.

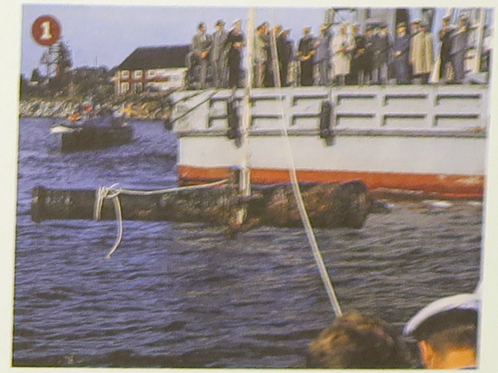
Two lifting pontoons were anchored to either side of the wreck and heavy cables were drawn between them, beneath the ship. The pontoons were pumped full of water and the cables were tightened. When the water was pumped out, the pontoons would rise and take Vasa with them, but no one was sure that it would work. The clay of the harbour bottom may have held the ship so tightly in its grip that it could not be lifted, or the hull may have been destroyed by the enormous tension in the cables.

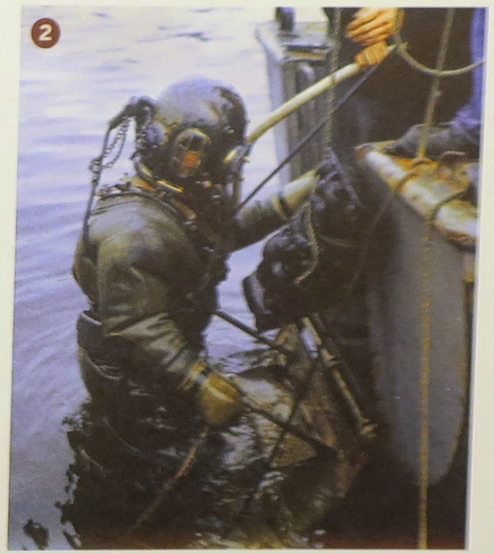
On 20 August 1959, it was time. The newpapers, radio and television were all present. At noon, the pumps began emptying the pontoons. Four hours later, the first movement was felt. The ship had held together, and the tunnels had broken the hold of the clay. For the first time in three centuries, Vasa was on the move.

Over the next four weeks, in a series of lifts and short moves, Vasa was transferred to the shallower waters of Kastellholmsviken. This was where she would rest for most of the next two years while the final lifting operation was prepared.

Between September 1959 and April 1961, Vasa lay at a depth of 18 metres and divers could spend long hours emptying the upper deck of debris and mud. It was also necessary to make the ship as watertight as possible, as it was hoped to refloat the ship for a short stretch. The divers closed the gunports with custom-built covers and plugged thousands of empty bolt holes where the iron had corroded away completely.

In preparation for the final lift, Vasa hung from the pontoons in a web of cables just beneath the surface. 24 April 1961 would be the high point of the Vasa project, when the ship returned to the world.







1. One of Vasa's cannons lifted during the salvage operation. Most of the ship's guns had already been salvaged successfully in the 1660s. **2.** A diver bringing up objects from Vasa. **3.** The figurehead lion is salvaged.

1959

The salvage operation. The method used to raise Vasa in 1956 – 1961 was essentially the same as that developed in the 15th century and attempted in 1628 – 1629. It was clearly understood and offered a high chance of success. Other methods were considered briefly but discarded at the insistence of Axel Hedberg, the Neptune Company's operational director.

The navy's diving vessel Belos was used for both lifting operations under the command of Captain Bo Cassel, a keen diving historian who tested a replica of the diving bell used to salvage the guns in the 1660s.

Neptune's support vessel Sleipner was used for both lifting operations.

Atlas was one of two tugboats used to move the pontoons with Vasa hanging beneath in steel cables.

Each pontoon had a lifting capacity of 600 tonnes and could raise the ship approximately 5 metres in one lift, most of which was lost when the vessel was set back down to prepare for the next lift. Each successful lift gained a little more than a metre.

The lifting cables were doubled lengths of multistrand steel cable, made especially for the salvage operation.

Vasa's longboat was found lying next to the ship and was raised largely intact in 1967 at the end of diving operations at the location where the ship sank.

Tunnels for the lifting cables began as large pits in the loose mud of the seabed but became narrow shafts in the hard clay underneath.

Orbis Arctoi nova et accurata delineatio, the 1626 map of the Nordic region by Anders Bure, a Swedish mathematician, cartographer and a member of the royal council of war. This map can be seen at the National Library of Sweden in Stockholm.

The Baltic Sea – highway and battlefield

Many countries wanted to control the port cities around the Baltic Sea. This is why a large, effective fleet was important to Sweden.

THE MAP OF SWEDEN in the early 17th century looked very different to today. The island of Gotland and the southwestern counties of Halland, Skåne and Blekinge all belonged to Denmark; as did Norway, which included the border districts of Bohuslän, Jämtland and Härjedalen. On the other hand, Finland made up half of the kingdom of Sweden. Travel on land was difficult, so this far-flung kingdom and its possessions were connected by the Baltic and the rivers flowing into it.



King Gustav II Adolf

During the reign of Gustav II Adolf, Sweden pursued an expansive foreign policy aimed at establishing Swedish dominance in the Baltic region. This policy required a powerful and effective navy. Baltic ports were the sources of the timber, tar and hemp on which all the navies of northern Europe depended to keep their ships afloat. Whoever controlled these ports would have enormous influence, and all the great powers of the day were involved in the struggle for Baltic dominance. Even the United Provinces (now the Netherlands), Great Britain and France had an interest in the outcome of Baltic conflicts. The important passage into and out of the Baltic via Öresund was controlled by Denmark. Sweden had just a small access point to the west coast via the Göta River and the newly founded town of Gothenburg.



Sweden lost two ships, Solen and Tigern, in a sea battle outside Danzig in 1627. Contemporary engraving.

The Baltic coast came increasingly under Swedish dominance in the first half of the 17th century. In the 1620s, Swedish control expanded westwards from Estonia, to Riga in modern Latvia to Pillau (now Baltiysk in the Russian enclave of Kaliningrad). Sweden was on its way to becoming a major regional power.

Sweden was almost constantly at war with its neighbours, especially Denmark, although in 1628 Sweden and Denmark were briefly at peace. Between 1621 and 1629, Gustav Adolf focused primarily on Poland-Lithuania. Sweden gained control of Riga and much of what is now Latvia and parts of Lithuania, although Polish kings continued to claim the throne of Sweden until the 1660s.

At the same time, the great series of conflicts we now know as the Thirty Years' War was just getting started. What began as a succession struggle in Bohemia and a religious conflict between Catholics and Protestants escalated into a general European war which eventually involved all the major European powers. The initial alignment of powers placed the Protestant princes of northern Germany at odds with the Catholic Habsburg emperor Ferdinand II, but as the war progressed some princes changed sides despite their religion and other European powers began to intervene. Sweden largely stayed clear of the war while it was fighting Poland-Lithuania, but after a truce was arranged with King Zygmunt III in 1629, Gustav Adolf was free to invade Germany in support of the Protestant princes in 1630. Sweden eventually became one of the decisive forces in the war, emerging as one of the victors in 1648.

The navy was essential to Swedish military strategy under Gustav Adolf. It transported troops and supplies to the fronts on distant shores, blockaded enemy fleets in their harbours, diverted the enemy's trade to Swedish-controlled ports where it could be taxed, and maintained communications between units and with the homeland.

In November 1627, the navy suffered a defeat in the only fleet battle during the reign of Gustav Adolf. The small Polish navy escaped from the Swedish blockade of Gdańsk by sailing around the blockading squadron, attacking two ships, Solen and Tigern. Tigern was captured, and Solen was scuttled by her own crew in order to avoid the same fate.

This was why it became even more important to complete Vasa. Her role was flagship of the reserve squadron, waiting orders to sail south.



Northern Europe, 1628. Down on the Continent, the war was raging that was to last for thirty years.
● Denmark-Norway, ● Sweden-Finland, ● Germany, ● Poland-Lithuania, ● Russia, ● United Netherlands



King Zygmunt III Wasa

Gustav II Adolf's cousin Sigismund, was elected king of Poland-Lithuania as Zygmunt III in 1587 and then inherited the Swedish throne from his father, Johan III, in 1592. He followed the Catholic faith, which raised concerns in staunchly Lutheran Sweden. In 1599 he was deposed in a revolt led by his uncle, Duke Karl of Södermanland, who became king as Karl IX in 1604

Karl's son, Gustav Adolf, succeeded him in 1611, but Zygmunt never gave up his claim to the Swedish throne, and Gustav Adolf's invasion of Zygmunt's realm in 1621 was meant to settle the issue.

Differing ideas of how to fight naval battles

King Gustav II Adolf and the admiralty had very different ideas of how a naval battle should be fought. Naval officers believed that the crucial moment would come as men armed with axes and spears swarmed onto the enemy ship to subdue its crew in hand-to-hand fighting. The king, a keen artillerist who often tested new cannon models himself, saw the future of naval warfare as artillery duels between floating batteries of heavy cannons.

The machine of war

The cannons gave Vasa unsurpassed firepower. She could have been the most successful war machine of her age, had she been more stable.

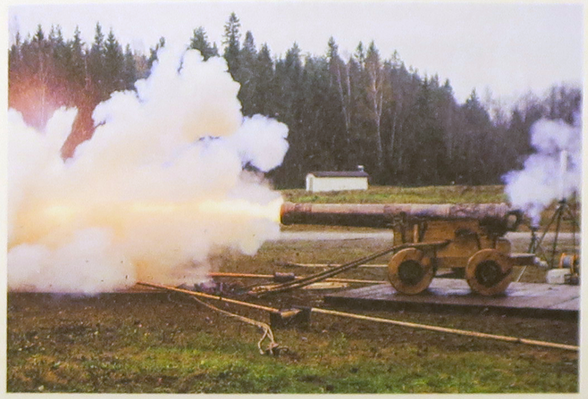
WHEN VASA SAILED ON HER MAIDEN VOYAGE, she was the most heavily armed ship in the Baltic, if not the world. Other ships were larger or carried more guns, but with a main battery of 48 bronze guns firing 24-pound (10 kg) iron shot, plus 16 lighter guns on the upper deck, nothing could match the total firepower of Gustav Adolf's newest ship.

Gustav Adolf had ordered the ship with two full gundecks kitted out with a new type of lightweight 24-pounder cannon, a portable siege gun originally developed for the army. This had limited range but enormous impact energy.

Round shot, solid iron spheres weighing 10 kilos, was the most common form of ammunition, but special ammunition was used to disable a ship or its crew. Crossbar shot (cannonballs with large spikes though them) and chain shot (two half-balls connected by a length of chain) would tear large holes in the sails and cut the ropes of the rigging so that the enemy could not sail away or manoeuvre. Case shot (hundreds of lead musket balls in a wooden cylinder) turned a cannon into a giant shotgun, and this ammunition was most feared by sailors at close range.

A naval battle in the early 17th century usually began with an artillery duel, but was then succeeded by boarding and hand-to-hand combat. The Polish victory at Oliwa in 1627 and the great Swedish victory at Femern in 1644 were decided by boarding. The battles of the Anglo-Dutch wars (1652–1675) showed that Gustav Adolf's notion of artillery duels was correct. Artillery and gunnery skills became the decisive factor in naval battles, and ships configured like Vasa, with two full gundecks and 70 to 80 guns in total, became the backbone of most of the major navies of Europe from the latter half of the 17th century until sailing warships were phased out in the mid-19th century.





A copy of a 24-pounder cannon from Vasa is being test-fired here. These cannons turned out to have surprising firepower.

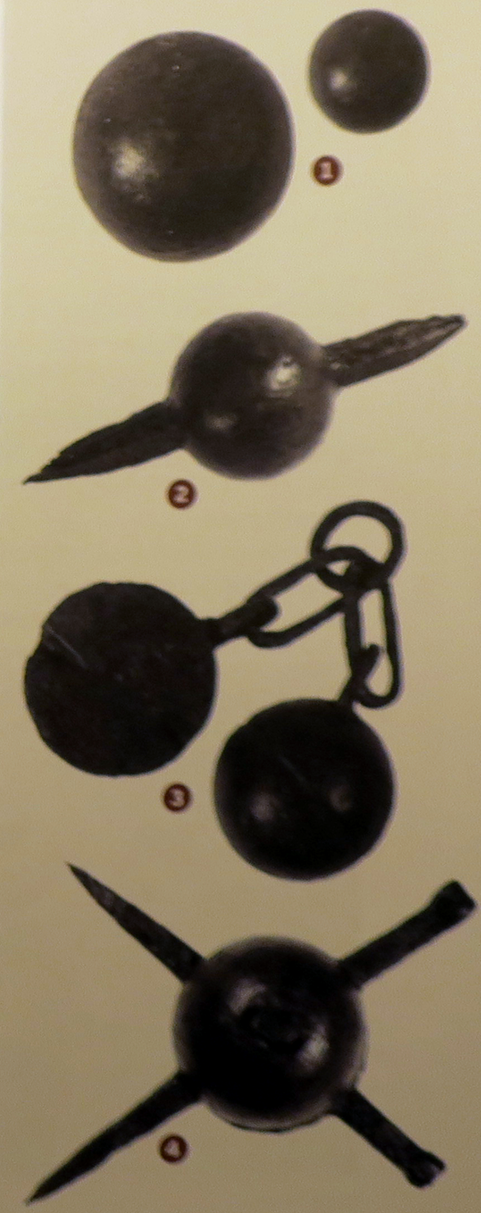
The power of the cannon

The shot itself caused little damage to the crew – few men were actually hit by cannonballs. Instead, the cloud of splinters created by the shot could injure or kill dozens of men standing near the point of impact. A hit to the thinnest part of the hull was of little risk to the crew as the shot would punch a clean hole through the hull and create a small number of tiny, largely harmless splinters. If the cannonball hit a thicker place in the hull, the shockwave would break off larger pieces that were much more dangerous.

Tests carried out in 2014 using a replica of one of the cannons, shooting at a copy of the side of Vasa, showed that the cannonball, travelling at about the speed of sound, would punch all the way through even the thickest part of the hull and still have enough energy to make an exit hole through the other side of the ship. Although such guns had a theoretical tactical range of up to 1,000 metres, the difficulties of aiming from the deck of a rolling ship meant that it was not practical to fire at ranges much beyond 400 metres.

Ammunition of various kinds

1. Round shot was used for all kinds of targets, mainly to damage the hull. **2.** Crossbar shot was used against sails and rigging at longer range. **3.** Chain shot was used against sails and rigging at close range. **4.** Scissor shot was used against sails and rigging at longer range.



Building Vasa

Vasa was constructed at Skeppsgården in Stockholm, which was one of the largest employers in Sweden at that time. The shipyard was run by foreign entrepreneurs in the 1620s.

KING GUSTAV II ADOLF wanted to stimulate Swedish production by recruiting foreign experts to establish firms in the country. In the 1620s, the royal navy yard in Stockholm – where the fleet was maintained and most new ships built – was leased to Dutch entrepreneurs.

In January 1625, the king signed a contract for operation of the navy yard with two Dutch businessmen, Henrik Hybertsson and Arent de Groote. Master Henrik had been building ships for the Swedish navy for more than 20 years, and Arent was a young businessman with contacts all over northern Europe who could supply timber, iron, tar and hemp. They agreed to maintain the hulls of the navy's ships and build four new ships. Two of these would be of a new, powerful type, while two would be smaller vessels typical of the ships in service at that time.



Sailmakers

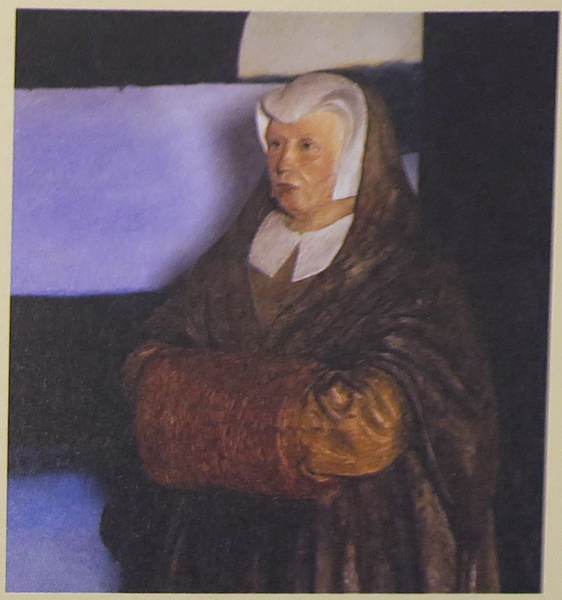
They began more or less immediately to buy timber so that the keel of the first ship, Vasa, could be laid in 1626. The new ship was made mainly from oak, which is strong, durable and widely available. Naturally curved timbers for stems, frames and knees were cut in Swedish forests along the east coast, from around Lake Mälaren and south to Kalmar. The long, straight planks for the outside and inside of the hull were purchased as rough sawn timber on the international timber market in Riga, Königsberg (modern Kaliningrad) and Amsterdam. The Dutch controlled much of the timber trade, so the Amsterdam market was a very international source. Pine for masts, upper deck planks and internal partitions was found closer to Stockholm. Iron for nails, bolts and anchors came from Sweden. All these materials were collected in Stockholm, where hundreds of sawyers, carpenters, turners, joiners, boatbuilders and smiths manufactured and assembled the thousands of components that made up a ship.

Vasa was built without any drawings, in a method commonly used in the Netherlands. When the keel had been laid and the stem and sternpost set up, the planking at the bottom was assembled using temporary clamps out to its widest point, where it turned up into the sides. The frames were then inserted into the base and the clamps were removed. Further frames were erected on this base, and the sides were planked and the decks added.

Another entrepreneur, Paridon von Horn, supplied the rigging for Vasa. He collected sailcloth from the Netherlands, hemp from Riga and tar from Finland, and then found craftsmen in Sweden to sew the sails and lay up the kilometres of rope needed. When the hull was nearly complete, it was launched in the spring of 1627 and the navy used this material to rig the ship. All the work was probably completed late in the summer of 1627, but the ship waited another year for its armament to be delivered.

Master Henrik never got to see the finished ship. He fell ill in late 1625 and had to hand over the management of Vasa's construction to his assistant, Hein Jakobsson, in mid-1626. Henrik died in the spring of 1627.

17th-century Sweden was set apart from many of the countries of northern Europe in terms of the role women played in the economy. In Sweden, legal rights depended more on marital status than gender. As a result, women often controlled large landed estates or participated in significant roles in family businesses. It was therefore natural for Margareta Nilsdotter to take over the navy yard when her husband died.



Margareta Nilsdotter

Margareta Nilsdotter, daughter of a mayor of Stockholm and widow of another, married Henrik Hybertsson in 1623 and became an important person in the family's business. She managed the family's rural estates and made purchases for the navy yard. She also lent money to the navy yard to cover shortfalls in income from the state, and was one of the Crown's largest creditors in 1626. When Henrik died, she inherited the navy yard contract as his heir. Her family tried to talk her out of it, because they could see it was a bad business deal. They were right, and when Margareta died in childbirth in 1630 (with a third husband), she left behind her a financial mess which took more than 15 years to clear up in the courts.

Henrik Hybertsson

Master Henrik, Vasa's designer, was born and grew up in Rijswijk in the Netherlands. He later moved to Amsterdam before coming to Sweden at the beginning of the 17th century to work for the Crown. In 1621 he became one of the partners running the navy yard, and in 1625 he and his partner, Arent de Groote, signed a new contract with the king. He had built several successful ships for the Swedish navy, but Vasa's failure was his lasting legacy.

The navy's activities were directed from the royal palace, Tre Kronor.

The Stockholm navy yard

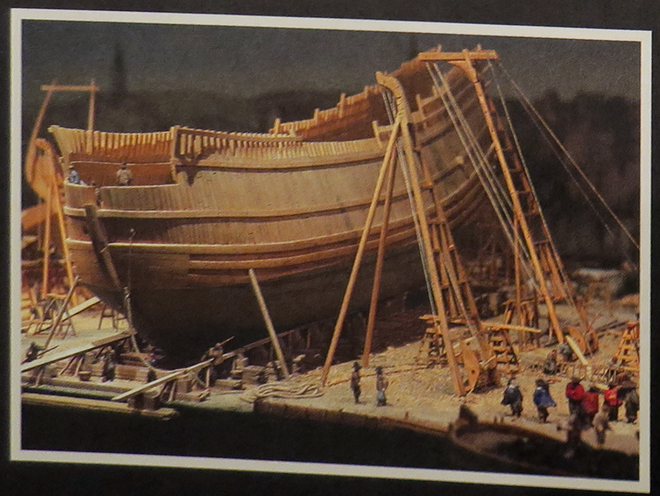
The shipyard where Vasa was built lay on an island in Stockholm harbour known as Skeppsholmen ("ship island"). Nowadays, this is a peninsula called Blasieholmen in inner city Stockholm. It was a centre for the maintenance of naval ships since the mid-16th century, but not for new construction. After 1618, the Crown concentrated new building in this yard and another yard in Västervik, and the Stockholm yard grew quickly.

Master Henrik recruited new carpenters as seasonal labour from the Netherlands to increase the peak staff to over 300, which made him one of Sweden's largest employers. Dutch design and construction practices dominated in the yard, which could cause problems. The Dutch and Swedish carpenters spoke different languages and used two different measurement systems. It is not surprising, then, that the ship is asymmetrical in shape and inconsistent in its details.



Timber supplier

Brita Bååt owned a large country estate called Ängsö, near Västerås. She exploited this effectively, selling timber and iron. She was one of the providers of timber to the navy yard in the 1620s, with a semi-permanent staff of carpenters and sawyers cutting trees and rough shaping them on her estate.



Vasa, soon ready for launching. The upper deck, sterncastle and beakhead were completed when the ship was afloat.



The large anchor smithy had several forges, which were large open hearths. The master anchorsmith was one of the most powerful figures in the yard, and one of the best paid.

The sailing ship

The rig was complicated. A cloud of canvas and miles of ropes were needed to keep Vasa moving.

FULLY OUTFITTED, Vasa weighed about 1300 tonnes. To move this weight, she carried the typical rig used on big ships of the era, 1570–1670. Three masts in the hull and one on the outer end of the bowsprit carried ten sails, but paintings and sailing logs of the age tell us that only a few of these were used most of the time, especially in the limited sailing conditions of the Baltic.

When Vasa sailed, only four of the ten sails were in use. The other six, plus the sails for the ship's longboat, were found in the sailroom on the orlop. A ten-year conservation project succeeded in unfolding and stabilising this unique and fragile find.

The surviving sails were made of two types of cloth. The heavier lower sails were made of hemp, while the light upper sails were a mixture of hemp and flax. The rigging contract for the fleet that was signed in 1626 specified French cloth for the navy's sails, but this was expensive. The width of the cloth suggests that the contractor bought Dutch cloth instead, a common substitution.

The many kilometres of rope needed were collected from a wide range of sources, and vary in quality as a result. The heaviest are the anchor cables, 13–15 cm in diameter and originally 200 metres long, weighing up to 3 tonnes each.

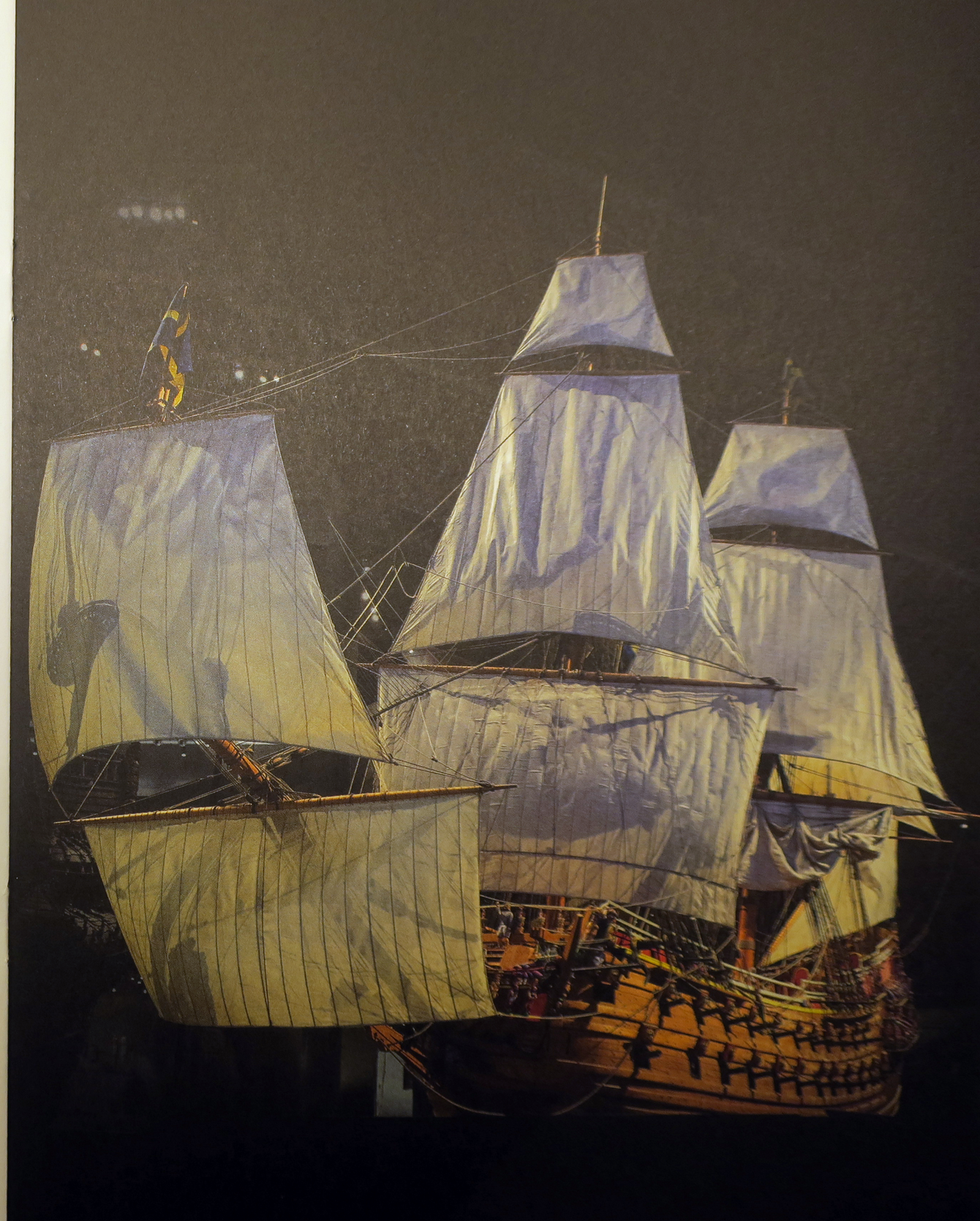
All this cable and cloth required a large crew to operate the rig. The rig was complicated, but it was well suited to the composition of the crew. A few knowledgeable and experienced mariners managed a much larger number of unskilled labourers who provided muscle power. Unlike in later centuries, few men had to go aloft into the rigging and most operations could be performed from the deck.

The hull is long and narrow, which would have made the ship relatively fast in calm waters. The top speed, had the ship not been so unstable, may have been in excess of 10 knots (18.5 kilometres/hour), but normal sailing speeds probably averaged about half of this.

THE STEERING WHEEL was still 75 years away from being invented when Vasa was built. Instead, large ships were steered with an extension to the tiller known as a whipstaff, which passed through a bearing in the deck. It provided good control over the rudder but demanded a lot of the helmsman, who had to dance back and forth to steer. Aboard Vasa, the view from the helm is limited to the compass and the sails – the helmsman could not see in front of the ship and relied on orders from the officer in command.

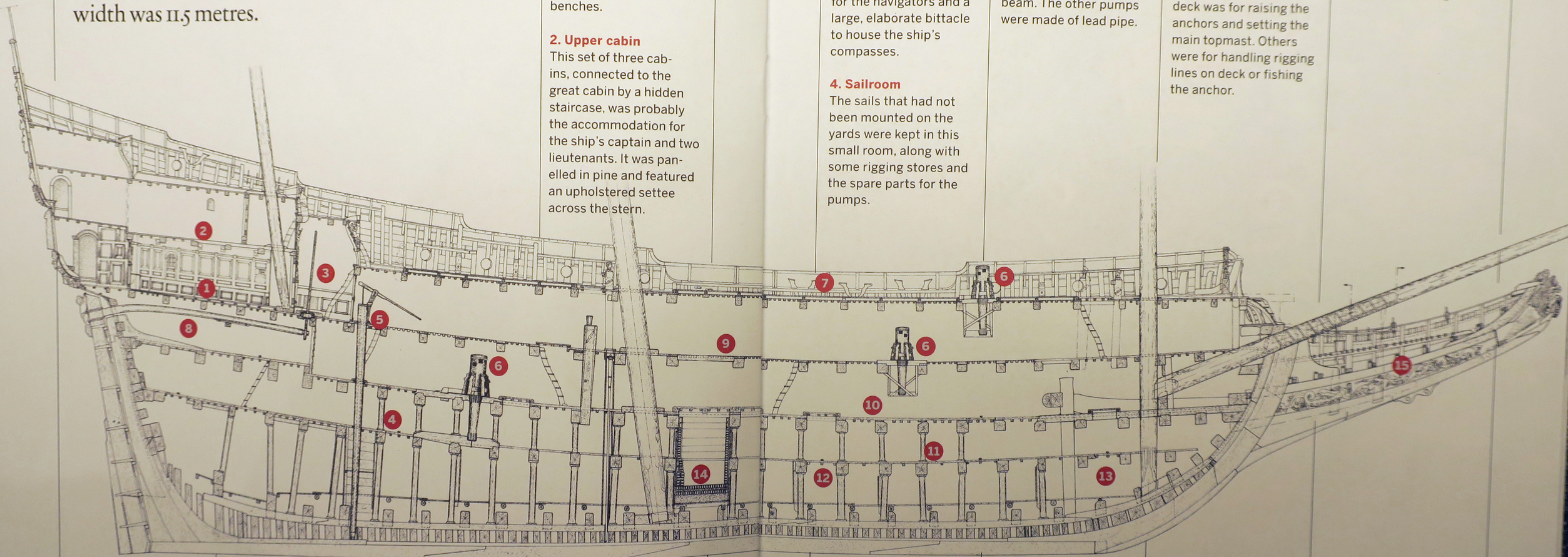
Navigation depended on the compass for direction, a sounding lead to determine water depth, and hourglasses to measure time. Speed could only be estimated, and the Swedish navy did not rely on charts at this time.

Open water sailing routes were short, and knowledge of the coast with its many shoals, rocks and islands was essential to safe arrival at the destination.



The anatomy of a ship

The total length of Vasa, including the bowsprit, was 69 metres. Her maximum width was 11.5 metres.



1. Great cabin
This luxurious room, fitted out in highest quality imported oak panelling by the king's joiners to look like a room at the royal palace, was used for receiving important guests. It also had four fold-out double beds built into the benches.

2. Upper cabin
This set of three cabins, connected to the great cabin by a hidden staircase, was probably the accommodation for the ship's captain and two lieutenants. It was panelled in pine and featured an upholstered settee across the stern.

3. Steerage
This narrow, tall room acted as an antechamber to the great cabin, but it was also the steering position where the helmsman manned the whipstaff. It included two small coffin berths for the navigators and a large, elaborate bittacle to house the ship's compasses.

4. Sailroom
The sails that had not been mounted on the yards were kept in this small room, along with some rigging stores and the spare parts for the pumps.

5. Pump
The ship carried four pumps. The main pump was a bored-out alder log with the moving parts operated by a brake handle, and it dumped the water over the side through a hollow deck beam. The other pumps were made of lead pipe.

6. Capstan
The ship was fitted with three capstans which allowed the crewmen to combine their muscle power to lift heavy weights, such as anchors and masts. The main capstan on the lower deck was for raising the anchors and setting the main topmast. Others were for handling rigging lines on deck or fishing the anchor.

7. Upper deck
The upper deck carried 14 light cannons and was the main space for handling the ship's rigging. The lack of space meant that men were not allowed on deck unless they were working.

8. Gunroom
Gunners' stores such as rammers and other loading tools were kept here. Traditionally, it also provided accommodation for the ship's gunners and other petty officers. The massive tiller swings back and forth across the width of the room, which may have been a little inconvenient for people living here.

9. Middle deck
The upper of the two gundecks carried 24 cannons and was the living space for about 200 men, who slept on the deck between the guns in groups of six to eight.

10. Lower deck
Like the middle deck, the lower deck carried guns (30 cannons) and provided living space for the crew, probably more than 220 men. It was also used for handling the anchor cables, which entered through hawseholes at the bow.

11. Orlop
The orlop was used primarily for storage, although two massive cannons were mounted in the transom to defend the stern. This was mostly open space, but it had separate smaller compartments at the bow and stern. In battle, the ship's barber might treat the wounded here.

12. Hold
The primary storage area in the ship was divided into nine compartments by bulkheads, many with sliding doors in them. The bottom of the hold was filled with 120 tonnes of stone ballast, covered by loose planks to form a working floor.

13. Magazine
Gunpowder was stored in the bow, as far below the waterline as possible, and as far as possible away from any source of flame. This compartment contained some other gunners' stores, as well as some rigging spares.

14. Galley
The cook prepared the crew's meals on a brick hearth built in a sand-filled box just before the mainmast. He was able to light several fires at once on the large brick surface, and there was a hood above to prevent the interior of the ship filling with smoke. Some cannon ammunition was also kept here.

15. Beakhead
This long, triangular balcony projecting from the bow provided working space for handling the sails set on the bowsprit. Instead of a floor or deck, it had gratings so that water would drain out. The beakhead had two permanent seats of ease (toilets) mounted here, where the smell would be carried away from the ship and the waves would help keep them clean.



The language of royal power

Vasa's ornamentation was impressive and colourful. Its aim was to reinforce crew morale and to make it clear to the rest of the world that Sweden was a major power.

WHEN VASA WAS RAISED, no one could have expected the wealth of sculpture that was revealed: Roman warriors and emperors, mythological demigods, lions rampant, heraldic gryphons, biblical heroes, rosy-cheeked cherubs holding olive branches. In all, more than 700 carvings were recovered.

An important part of a warship's function in the 17th century was to be a visible projection of the kingdom's power. It was also a symbol of the king's self-image, policy and ambition.

Vasa's sculptures represent war aims, heroic courage, faith in God and the mythical lineage of the king. They face both inwards and outwards, strengthening the fighting spirit of the crew and showing other countries that Sweden was a power to be reckoned with.

But who could actually understand the meaning behind the sculptures? Society's educated elite certainly could, while others may only have appreciated the ship's great size, its bright colours and its many cannons. Some may have recognised the heroes of the Bible, such as David and Gideon.

When Vasa was raised, the hull and its ornamentation were all brownish black after centuries underwater, but the newly built Vasa had been brightly ☞

The Vasa coat of arms

Vasa's coat of arms is located in the middle of her stern. This acts as the ship's nameplate, and its imagery tells the tale of the royal family in Sweden. The symbol for the Vasa family is a bundle of sticks, a fasces, although here it looks more like a wheat sheaf. Two cherubs hold the coat of arms between them. These are God's messengers and show that the the Vasa family has been charged with governing and protecting the Kingdom of Sweden and the people who live there. The olive twigs symbolise peace, while the lush fruits suggest a rich, flourishing Sweden.



The national coat of arms is displayed on Vasa's stern, flanked by two impressive lions.

coloured. This was revealed in the 1990s, when samples of paint from a selection of sculptures and planking were examined under a microscope and analysed chemically. They revealed a very colourful Vasa: all the sculptures were painted in vibrant hues, many details or even whole sculptures were gilded, and the upper parts of the ship's sides and transom were a strong red, with yellow rails. Warriors, tritons and sea serpents were painted in bright colours with an unexpectedly nuanced touch. The large model of Vasa in the ship hall gives an overall impression of the colour scheme.

Sweden needed specialists in both shipbuilding and decoration, so craftsmen were encouraged by the Crown to emigrate from other parts of Europe. We know the names of three of the master carvers behind Vasa's sculptures: Mårten Redtmer, Hans Clausink and Johan Thesson. Like many of the other craftsmen working in the navy yard, they came from Germany and the Low Countries. Their different styles can be recognised from sculptures they created for other customers, such as church pulpits and organ fronts.

The carvers did not devise the sculptures themselves, but used their skills and motifs from pattern books to convey the customer's ideas. We do not know who decided what ideas would be realised in sculptures, although the king probably had some input – some of the motifs represent ideas or stories which we know were important to him.





Sharp contrasts and bright colours attract attention to the bow and stern. Gilding was used on the most important elements, such as the lions holding the national coat of arms. Bright yellow was used instead of gilding in many places. Red was a royal colour, a sign of status, in this period.

The colours of Vasa

Qualified painters of the age were commissioned for the brilliant painting of the sculptures. These were painted using the same techniques and pigments as other ornamentation on pulpits and organs in churches, for example.

Art conservator and historian Peter Tångeberg has investigated how Vasa was painted. After twelve years of examination, hundreds of microscopic fragments of colour have been analysed and interpreted. The pigments used were primarily ground minerals.

Paint pigments identified from analyses of specimens from Vasa:
Reds: cinnabar, iron oxides, hematite and red ochres, red lead oxide, madder.
Greens: Spanish green, malachite.
Yellows: yellow ochre, lead-tin yellow, orpiment.
Blues: indigo and copper blue, cobalt.
Whites: white lead, bone.
Blacks: lamp black, ivory black.



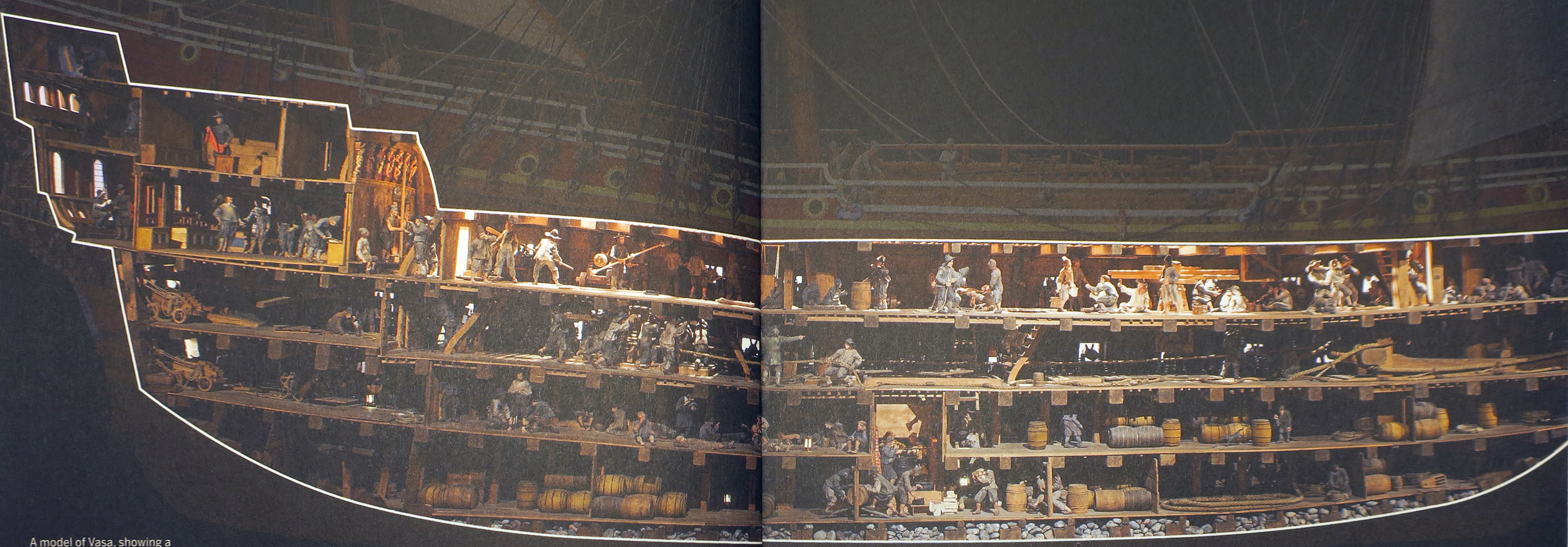


The original colours are still preserved in a few places, such as inside the mouth of this gunport lion.

The figurehead lion

Vasa's figurehead is a gigantic leaping lion. The lion represented strength and courage and was often used as a symbol for royal power, and is a traditional emblem used by Swedish kings since the Middle Ages. Gustav Adolf often associated himself with the lion.





A model of Vasa, showing a section through the ship.

A floating community

Naval ships had to function under sail and in battle, requiring a large crew. People with many different skills were all gathered together in a limited space.

VASA WOULD HAVE BEEN EXTREMELY cramped with the entire crew on board: 450 people – the population of a medium-sized village – packed into barely 800 square metres of deck. For the ship to function under sail and in battle, these people had to form a community that could live and work together for months at a time. Not everyone on board was male. The navy allowed sailors to bring their wives aboard when the ship was in home waters and unlikely to encounter the enemy. In Vasa's case, the crew were also allowed to invite guests on board for the initial leg of the maiden voyage. These women and children would have disembarked the ship at Vaxholm and returned home. The skeletons of at least two women are among the human remains found in and around the ship.

Organisation. According to the manning plans for 1628, Vasa should have had a crew of 133 mariners and 300 soldiers. The captain was in overall command of both groups. The sailing crew of 90 seamen was divided into two watches, each under the command of one of the ship's lieutenants. Each watch had a pilot responsible for navigation and a master, who was responsible for sailing the ship.

The purser made sure the ship was adequately provisioned, while the cook prepared meals. Discipline was maintained by the provost, who also handled damage control in battle.

The soldiers, who were only on board if the ship was deployed to an active theatre of war, had their own officers but also obeyed the captain. In battle, they helped man the guns and fought hand-to-hand in boarding actions. When not in action, they had to stay out of the way of the sailors and probably spent most of their time below deck.

Besides the crew who "belonged" to the ship, some personnel were assigned from the navy's central reserve. These included a priest, who held regular church services, and a trumpeter or drummer for signalling. A number of ship's boys could be assigned to the ship as servants and messengers for the officers, and the navy yard provided a team of carpenters to deal with maintenance.

Recruiting and promotion. In 1628, the vast majority of seamen were conscripts, or forcibly recruited. Conscription commissioners visited each parish periodically and took one man in ten aged 18–48 for military service (15–60 for the navy if they had prior naval service). They looked for men with relevant experience, but the Swedish maritime community was too small to accommodate the navy and so many conscripts were farmers and labourers who knew nothing about the sea. The first part of every sailing season was probably spent training the new crewmen.

Officers and non-commissioned officers were paid professionals, with plenty of opportunities for career advancement. Admirals' positions were reserved for the nobility in theory, but skills carried more weight than birthright here as well.

Conscription. The Swedish conscription system was effective but hated, and the general population viewed it as much worse than high taxes. In each parish, the priest had the job of keeping records of which men were suitable for service and providing that information to the Crown.

During the Thirty Years' War, military service – particularly in the army – was widely perceived to be a death sentence. Few men came back, and many of those who did were maimed. Conscription into the navy was less lethal as crews did not spend the winter in unsanitary camps in Poland-Lithuania; and in Gustav Adolf's era they rarely saw combat, but blockade duty saw many die of disease.

Living on a warship. Seamen and soldiers were crammed together in the restricted space on the gundecks. The remains of sleeping pads and blankets show that they slept on deck and were able to keep warm as the sailing season extended well into the autumn. Non-commissioned officers slept on deck with the men, while the higher ranking officers had fold-out beds in the more luxuriously appointed cabins in the sterncastle. Hammocks did not become common in the Swedish navy until the latter part of the 17th century.

The navy's ships were moored in harbour or at anchor most of the time, and much of the time spent at sea in the 1620s involved the drudgery of blockading enemy ports on the Polish-Lithuanian coast. The large crews appointed for sailing and battle were thus underutilised and had to find things to do to fill their time besides dealing with the constant maintenance of the ship. Waxed thread, thimbles, shoe pegs, leather and shoe lasts among the finds indicate the hours they spent mending shoes and clothing. The crew whittled spoons and played board games or dice (boards for backgammon and Nine Men's Morris have been found). Tobacco had recently been introduced and several pipe fragments were found in sailors' chests, providing the earliest evidence of smoking in Sweden.

Personal possessions were carried in a bewildering variety of containers, from large blanket chests and casks to sacks and tiny boxes with combination locks. With few exceptions, the finds are made up of simple, inexpensive necessities. Foreign visitors to Sweden in the 1620s remarked that it was difficult to tell the nobles and peasants apart, and the finds from Vasa support this. A few items stand out: a simple gold ring, monogrammed pewter plates, a scrap of silk brocade, a fine beaver fur hat. A German table clock in a gilt brass case found in the great cabin was too inaccurate to be of practical use on a ship, but it showed off the owner's wealth.

Clothing. Neither the army nor the navy had uniforms. The navy occasionally paid part of a sailor's salary in cloth, but it was up to him to make his own clothes. Most men, of all classes, wore a short-skirted wool jacket over a linen shirt and baggy knee-length wool trousers. Most of the clothing found on Vasa is made from undyed wool, and was originally a wide range of browns and greys. Headgear for most was a woollen cap, sometimes with ear flaps. Sailors sometimes wore leather mittens, often with wool liners, to protect their hands. Shoes varied from simple flat-soled slippers to high boots made of elk hide, but most of those found are plain latchet shoes with flat soles.

Food. Barrels of bread, beer, dried and salt fish, salt meat and peas were stowed at the very bottom of the ship's hold before putting out to sea.

Food was preserved by drying, salting, pickling or smoking. Much of this food was inedible in its stored form and had to be soaked in water for several days before it could be cooked. Crews were fed dried and salted food even in summer, although the navy was aware that fresh food was needed to keep crews healthy and ships tried to carry lingonberries and cabbage and other fresh fruit and vegetables.

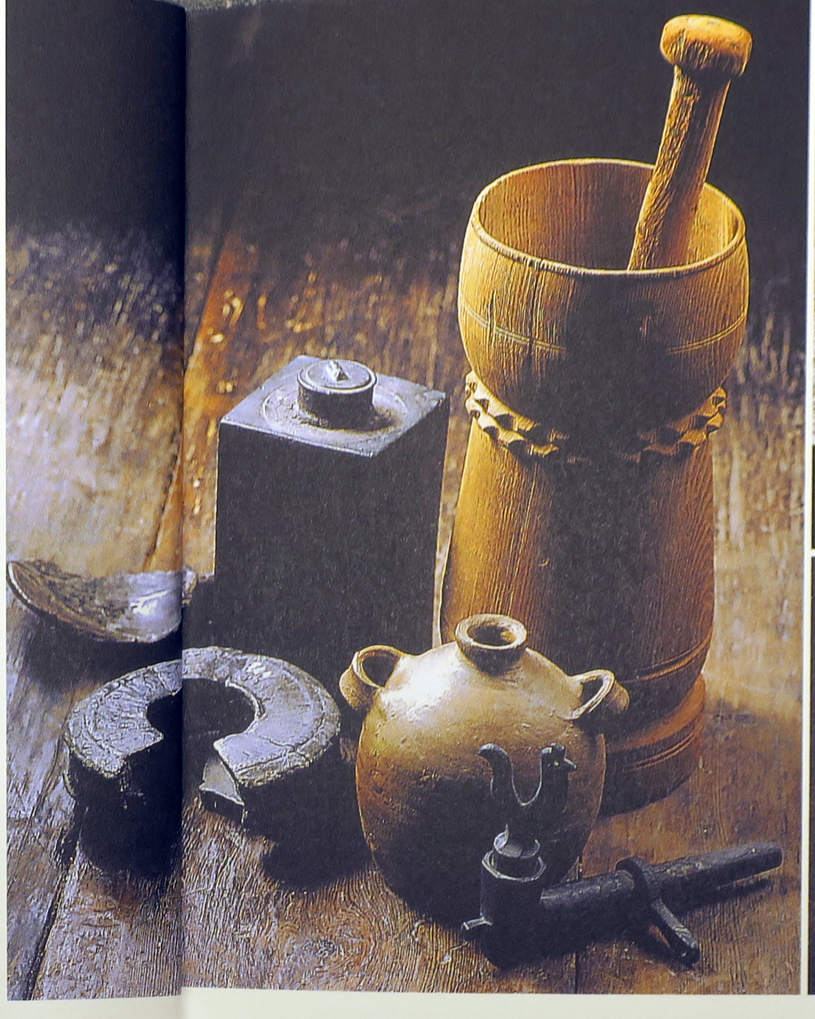


1. Wooden shoe lasts. Eleven shoe lasts of various sizes have been found aboard Vasa. **2.** A comb made from bone. One side was used as a louse comb. **3.** A cap with the lower edge up and then folded down so that there are three layers of fabric in the cap. The lower folded edge of the cap could be folded down over the ears. **4.** A soft leather boot. There were three dominant types of footwear fashion at the time of Vasa: the latchet shoe, the boot and the flat-soled slipper. All of these varieties were found aboard Vasa.



1. An extravagant dish with detailed decoration, used as a platter for food. Probably manufactured in the Stockholm area. **2.** All the spoons found aboard Vasa have been different. Here is a silver one, which probably belonged to an officer, and another made of wood that belonged to one of the regular crewmen. **3.** A brass sewing ring/thimble, open at both ends. **4.** A jug made of salt-glazed Rheinland stoneware with a lid made of pewter.









A small box with an owner's mark on the lid, containing a comb, a spoon, thread and wax.
Top right: These objects are thought to have been used These objects are thought to have been used by the cook. The barber, who was the medical "expert" on board the ship, was able to mix medicines using a grater, a whisk, mortar, spices, herbs and brandy.

Top picture: Officers' tableware, made of pewter, glass and stoneware.
Bottom picture: A beautiful backgamon set was found in a storeroom at the stern.

Fishing reels, floats, sinkers and nets show that some of the crew fished to supplement their provisions, and rifles and muskets of non-military type were probably personal possessions for hunting.

The navy only provided food from the ship's provisions once the ship left Swedish waters. The crew had to feed themselves in harbour or home waters, so it is not surprising to find that half of the animal bones found on the ship were not in the ship's storeroom, but in individual sailors' chests and casks.

The galley was down in the hold, before the mainmast, and fitted with a large brick hearth with brick walls on two sides. The hearth was covered with a wooden smoke hood, which created an upward draught so that the ship would not fill with smoke. Open fires always present a risk on wooden ships, so there were strict rules about when and where fires could be lit and the hearth was as far as possible from the powder magazine.

At mealtimes, the crew sat on the deck in small groups, known as messes. Each mess, probably comprising six to eight men, ate from shared bowls and drank from a shared tankard, but each man had his own spoon. One cask found on the ship contained a tankard with seven wooden spoons in it, perhaps providing storage for one mess.

Water stored in casks goes off, so the navy provided beer. Sailors were given a daily ration of two to four litres of beer, but it was relatively weak – perhaps about 2% alcohol, enough to keep it from spoiling.

The officers ate more or less the same food as their men, although they were free to buy their own provisions and they sat at a proper table with chairs, which were found in the upper cabin. They ate from pewter or ceramic dishes and may have drunk wine instead of beer. Their own beer was stronger, with more hops.

Illness and medical care. Dying of wounds was rare in the Swedish navy of the 1620s as the navy fought so few battles, but disease could rapidly incapacitate a crew. Scurvy is the disease most associated with sailors, although it was more common among Swedish farmers in the 17th century. Infection was always a problem due to the cramped conditions and poor hygiene. Dysentery and typhus could rapidly incapacitate a crew, and transport ships were kept busy carrying the sick and the dying from the blockade fleet off Poland-Lithuania to Sweden.

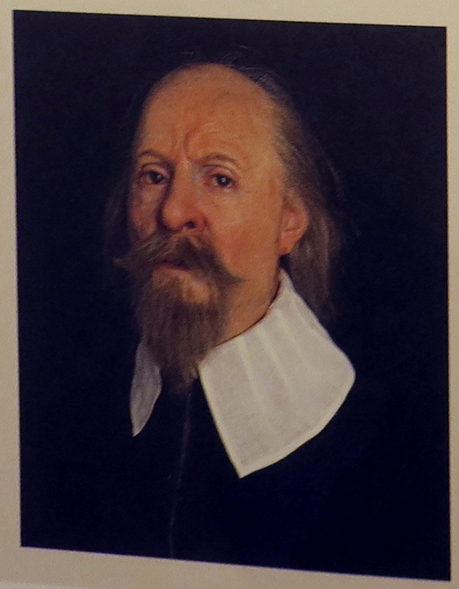
The barber, who treated injuries and illness as well as cutting hair, was largely powerless in the fight against disease. The barber was more skilled at dealing with injuries and his treatment of battle wounds was effective but brutal, often relying on amputation to prevent infection.

Some of Vasa's people

What we can learn from the skeletons found aboard Vasa tell us about the lives and health of people at that time.

MOST OF THE PEOPLE on board were saved when Vasa sank. They managed to escape the ship and either swim to shore or cling to the rigging or flotsam until they could be rescued. We know the names of seven people who were on board, all but one of whom survived. The remains of seventeen or eighteen of the dead were found in and around the ship. At least two of these are women.

The average height of the men was 167 centimetres; the shortest was 159 centimetres and the tallest 176 centimetres. They range in age from late teens to perhaps over 60. Their health is generally good, possibly better than the general population, but at least eight of them had broken bones that had healed and a few had multiple healed fractures. The two women showed signs of poor nutrition as well as injury. They had all lived hard, physically demanding lives.



"Johan"

One of the most interesting skeletons is "Johan". He is most likely to be "old Hans Jonsson", whose death was reported to the king as he was the oldest of the dead and was wearing high status clothing. He is 55 – 65 years old and 160 centimetres tall, and he had suffered a number of injuries, including the loss of the big toe on his right foot. He was wearing a long jacket made from a very expensive imported black cloth. He had lost most of the teeth in his lower jaw many years before his death. A badly healed left lower leg fracture resulted in hip problems.



"Beata"

One of the female skeletons "Beata", was of average height, around 160 centimetres tall, and in her mid-20s. She was wearing a fine jacket and embroidered shoes and carried a small knife. Her health was not very good. She had been malnourished or seriously ill as a child, which left marks on her teeth, and at the time of her death she was suffering from anaemia or chronic diarrhoea. She had a notch in one of her teeth, a characteristic feature of people who sew a lot and bite off the threads.

Who's who?

Around 30 men, women and children died in the disaster. These anonymous individuals were named in alphabetical order when research was being carried out. According to Swedish spelling practice, therefore, their names are Adam, Cesar, David and so on. Skeleton B was female, so she was called Beata.



"Helge"

This man was trapped beneath a gun carriage on the lower gundeck, on the port side where the water first rushed into the ship. He was around 35 years old and of average height, 165 centimetres tall. He was probably one of the first victims. Was he one of the men ordered to haul in the guns and close the gunports, or was he already below? Maybe he tried to escape through the open gunport when the ship listed and took on water, but he ended up lying on his side next to the gun carriage. His feet were still in his shoes when he was found, and he was still wearing the remains of his trousers and jacket. He had a few copper coins and a knife in a sheath in his pockets.

Preserving Vasa

Conservators and scientists from many countries are working together to help Vasa continue to fascinate and tell us more about her era.

VASA SPENT MORE than three centuries at the bottom of the sea. Nails and bolts rusted, parts came loose from the hull and sank or floated off. Thousands of pieces were found in the seabed around the ship and have since been restored to their rightful positions. Luckily, wooden treenails were used as well as iron bolts. This is why the hull has remained so intact despite the long time the ship spent underwater.

If Vasa had sunk anywhere else where the water is warmer and saltier, shipworms would have fed on much of the hull. However, shipworms do not thrive in the waters of the Baltic Sea. This is one of the reasons why shipwrecks are more likely to survive here than in other oceans.

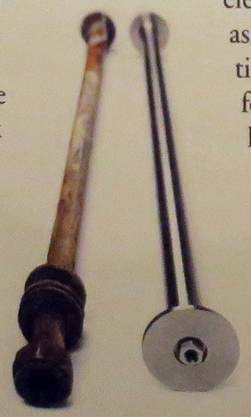
Wood that comes in contact with air after spending a long time submerged in water starts to crack and shrink. This is why it needs conserving.

When Vasa was salvaged, various conservation methods were tested and a decision was made to use polyethylene glycol (PEG), a synthetic wax that is water-soluble. It was the first time this had been used to conserve a ship. Vasa was treated with PEG and water ovebetween 1962 and 1979. Then the ship was left to dry slowly. Finally, PEG was sprayed onto the surface and heated in the wood. PEG is what makes the surface of the ship look shiny. All loose items also had to be conserved.

Wooden objects were packed in two long containers filled with water, PEG and a solution of boric acid and borax. Impregnation was complete after 18 months and the objects were left to dry slowly. A method known as freeze-drying was introduced in the 1970s. This technique was used to conserve the most delicate wooden objects. Many leather items were conserved in the same way.

Loose parts from the hull – structural elements as well as ornaments – were assembled and put back in position. Hundreds of fallen sculptures found the way back to their original locations.

In the 1990s, the lower masts were raised again and missing pieces were replaced with new ones. When Vasa had been salvaged, the hull was strengthened using over 5,000 steel bolts placed in the holes where the original ones had been before corroding away after centuries underwater. Some fifty years later, these new bolts had also begun to corrode and were replaced with stainless steel. Switching to lightweight stainless steel bolts caused Vasa to lose the weight equivalent to two medium-sized elephants. This change of bolts has also reduced the decay of the wood, which is promoted by rust.



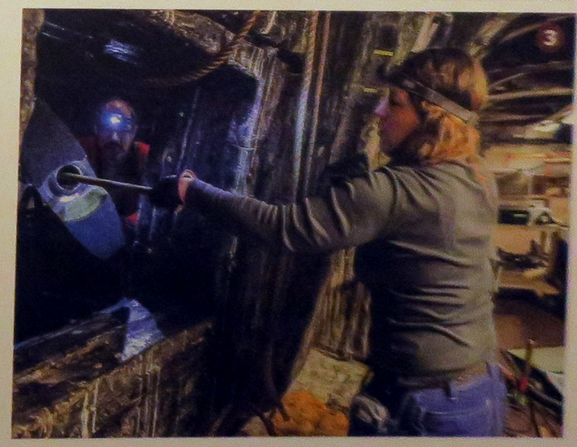
Switching to lightweight stainless steel bolts caused Vasa to lose eight tons.

The water in which Vasa was found was very dirty, and contamination had been forced into the wood. Chemical processes were triggered when she was brought to the surface and encountered air. These processes degraded and weakened the timber of the ship, and continue to do so. Conservators and scientists are working intensively on preventing this happening, and are aiming to find the best way of preserving Vasa and all the objects found with her. Even if the conservation work is completed, the hull and objects are still fragile and it is important to ensure that Vasa is kept in the right climate. She is displayed at a temperature of 18.5 °C, with humidity at 53 per cent. This low temperature slows chemical reactions. Many chemical processes demand water, so the humidity level of the wood should be kept low. Ambient humidity must not be too low, however, because this will cause the wood to crack. The museum is kept quite dark as light also has a degrading effect on the wood.

The ship is under constant supervision and measured regularly to detect possible movements in the hull. Cracks are measured, and pieces of wood are weighed to check that humidity under control. However, the hull has weakened irreversibly. The ship cradle is therefore to be replaced by a structure that will relieve the load on the hull more effectively. The museum is hiring engineers to create this structure to support the hull without getting in the way of visitors. A digital three-dimensional model has been designed by scientists working in partnership, and this allows various alternative forms of support to be tested so that the cradle can be constructed in the best possible way. A new supporting structure is crucial for Vasa's future preservation.







1. Vasa spent seventeen years being sprayed with polyethylene glycol (PEG), a synthetic wax that is water-soluble. PEG is able to penetrate wood and displace water, thus preventing shrinkage and cracking. **2.** Wooden objects treated with PEG. When it solidifies, the preservative polyethylene glycol is of roughly the same consistency as candlewax. Here, the surplus has formed a stalactite cave around Vasa's small wooden vessels. **3.** Vasa Museum staff changing bolts.

Vasa now and in the future

The dramatic history of Vasa has been – and continues to be – a source of new and important knowledge for a large international audience. Our ambition is to keep her preserved for a thousand years.

WHEN THE MUSEUM WAS BUILT, our aim was to attract 600,000 visitors a year. That didn't happen. A million people visited the Vasa Museum in its first twelve months. Numbers went down after that, as expected, only to rise 15 years later to more than a million visitors each year. The Vasa Museum has become one of the most popular maritime museums in the world. International visitors are very much in the majority, and foreign tourists outnumber Swedes.

The large number of visitors makes great demands of the museum. Our ambition is to make the Vasa Museum a place where people can be united and inspired by dramatic stories about the ship and the science involved in preserving her. One of the museum's aims is give as many people as possible the opportunity to find out about the history of Vasa in their own language. The museum offers guided tours in about 15 languages in high season, and information in over 40 languages can be found on the website. The film, brochure and audio guides are also available in around 20 different languages.

The Vasa Museum is not just a famous international attraction, either. This is an enormous showcase for the world's biggest archaeological ship find – a showcase that can accommodate 2,000 people at once. This places major demands on the indoor climate. The advanced climate control system maintains stable humidity and temperature levels 24 hours a day, 365 days a year. This is a necessity if we are to realise our ambition of preserving Vasa for a thousand years.

EVER SINCE SHE WAS BUILT in the early 17th century, Vasa has pushed the boundaries, presented challenges and provided a source of new knowledge. She was one of the most powerful ships in the world when she was built. Despite her failure to sail, Vasa could teach others how to go about doing things. The structures of her sister ships were much broader, which made them more stable and they later became successful flagships for the Swedish navy. Salvaging Vasa was a ground-breaking achievement; but so is preserving her, which presents us with an ongoing challenge.



Vasa is deforming over time, and she is measured regularly in order to track the movements in the ship's structure. 400 different points are measured twice a year using a system developed specifically for the Vasa Museum.



One of the conservators at the Vasa Museum investigates a piece of wood from the ship. The wood from the ship degrades slowly. Research is being carried out to find why this is, and to find solutions that could prevent further degradation.



One of the museum curators in the artefact stores.

The salvage of Vasa resulted in more than 40,000 objects being brought to the surface, and it heralded the beginning of what has been called the world's biggest puzzle. But the puzzle is still not complete, and the beauty of it all is that every single piece is just as interesting as the picture as a whole.

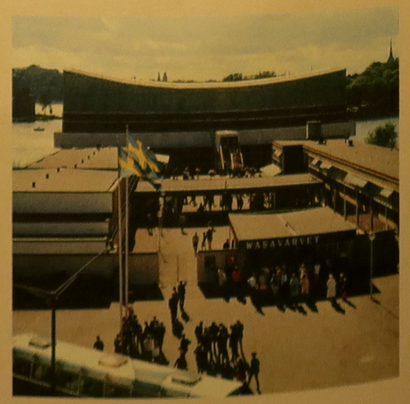
There are plenty of research projects ongoing at the Vasa Museum, often in collaboration with universities both in Sweden and abroad. These are looking at everything from chemical preservation techniques and osteological studies of the skeletons found on board to historical studies linked with 17th century shipping and gender science. The ship is like a 17th century settlement that has been lying on the bottom of the Baltic Sea for 333 years before then rising and being explored. If we are to understand all the aspects of Vasa and her era, it is vital to work closely with researchers and experts from many different disciplines.

Future generations should be able to experience Vasa, to learn from her and be inspired by her story. Asking new questions and viewing the collections from different angles will bring new insights. Vasa will continue to challenge and push boundaries for years to come.

The temporary Wasa Shipyard, 1961 – 1988

After she was raised in the spring of 1961, Vasa was towed into the Beckholmen dry dock near the site of the sinking and placed on a concrete pontoon. About halfway through the summer-long process of emptying the ship of mud, ballast and archaeological finds, the dry dock was flooded and the pontoon was towed out and moored on the western side of the island. An aluminium structure was built over the ship, and when the excavation was finished the whole assembly was towed six hundred metres to the new, provisional museum, the Wasa Shipyard, which opened to the public in February 1962.

The pontoon building was cramped and humid. For the first seventeen years the ship was sprayed with conservation solution at intervals throughout the day, even when the museum was open, and the ship looked more like a wreck than a ship. But it was at the Wasa Shipyard that Vasa became an international attraction. Between 250,000 and 500,000 people saw the ship each year, many of them foreign tourists. The public were able to watch the carpenters restoring the ship, and slowly the hull was rebuilt to its original profile with the long, narrow beakhead and high sterncastle.





The Vasa Museum today

Vasa has been resting since 1990 in her final harbour at her tailor-made museum on Djurgården in Stockholm.

Architects Göran Månsson and Marianne Dahlbäck won a Nordic competition with their design of a permanent museum for Vasa. The new museum was built over an old dry dock at Galärvarvet. The architects succeeded in the difficult task of placing a building 33 metres tall in the island's park landscape, partly by allowing the massive copper roof to end in soft transitions to the surrounding lawns. Three symbolic steel masts rise above the roof, as tall as Vasa's original masts would have been. In December 1988, tugs towed Vasa on her pontoon to her permanent home at Galärvarvet. The end of the new building was left open and the dry dock was filled. The ship was nudged through the narrow opening. The dock gates were closed for the last time, the water was pumped out, and after 36 hours the pontoon stood on the concrete plinths built on the bottom of the dock. Vasa had finally completed her maiden voyage.

The museum was inaugurated by King Carl XVI Gustaf on 15 June 1990. At that time, Vasa's hull was nearly fully restored. Over the next few years, the three lower masts were raised and the bowsprit was rigged. The ship now looks very similar to how she would have appeared in winter storage in January 1628.

Visitors are greeted by Vasa as soon as they enter. Vasa lies as if on a stage and is the clear focal point of the museum. The exhibitions are grouped around the ship and tell the story of her very short working life and long history, as well as describing research into the find and what historical sources have to say about the ship, the people and early 17th-century society.

VASA THROUGH THE CENTURIES



1625

Henrik Hybertsson and Arent de Groote sign a contract with Gustav II Adolf for the construction of four new ships.



1626–1627

Vasa's keel is laid at the Stockholm navy yard. The ship is launched and rigged.

1628

Vasa embarks upon her maiden voyage but sinks at Beckholmen, less than an hour after leaving the quay.



1663–1665

Nearly all of Vasa's guns are recovered and exported.

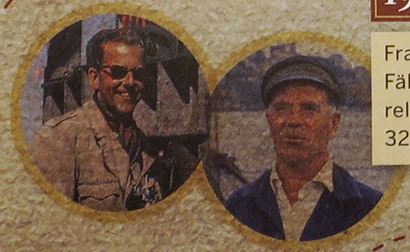
1920

Application made by the Olschanski Salvage and Diving Company to recover the ship – refused.



1954

Anders Franzén, a private researcher, begins searching for Vasa.



1956

Franzén and Per Edvin Fälting, salvage diver, relocate the wreck in 32 metres of water.

1959

Vasa is lifted from the site of the sinking and moved in stages into shallower waters in Kastellholmsviken; many artefacts recovered.



1961

Vasa returns to the surface in full view of the world's press and is docked at Beckholmen. Archaeologists excavate the interior. The ship is moved to the Wasa Shipyard.





1962

The Wasa Shipyard opens to the public; spraying with polyethylene glycol (PEG) begins.

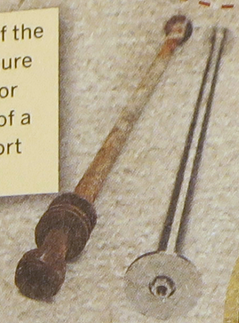


1979

Spraying finishes and controlled drying begins.

2014

Analysis of the hull structure begins prior to design of a new support structure.



2011–2017

5,000 rusty steel bolts dating back to the 1960s are replaced with high-quality stainless steel.



2004

A new climate system is installed to establish a more stable environment for the ship.

2001

An international research project aiming to meet long-term conservation needs begins.



2000

Acidic patches observed on the ship.





1993–1995

Vasa's masts and lower rigging are set up.

1981–1982

Nordic architectural competition for a new, permanent museum for Vasa; a design by Swedish architects Göran Månsson and Marianne Dahlbäck is selected.



1986–1990

The Wasa Shipyard closes. Construction of the new Vasa Museum begins. The Vasa Museum is inaugurated by King Carl XVI Gustav.



17th century

Meanwhile, around the world...

India, 1632

Shah Jahan, the emperor of the Mughal Empire, commissions the construction of Taj Mahal in Agra (present-day India) in 1632. This is a mausoleum for his beloved wife Mumtaz Mahal, who died at the age of 27. The name Taj Mahal is a derivation of her name, which means "Chosen One of the Palace".

Angola, 1624–1663

Ana Nzinga is queen of Ndongo and Matamba (present-day Angola) between 1624 and 1663. She became a symbol of opposition to the Portuguese, and her kingdom remains independent due to her diplomatic skills and brilliance in military strategy.

Great Britain, 1632

The circulation of the blood is described in the book 'An Anatomical Study of the Motion of the Heart and of the Blood in Animals' by English physician William Harvey, published in 1628. He is one of the first to experiment on animals to prove his theories on how the human body works.

America, 1625

Dutch colonial governor Peter Minuit buys southern Manhattan from native Americans in 1625. The settlement is called New Amsterdam. When taken over later by the English, the area is re-named Manhattan.