

Destination Harstad?

The wreck of the Belgica discovered
on the bottom of a norwegian bay



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I

The need of resources for the constantly growing industrial production resulted in a race to explore new continents in the nineteenth century. In this century many adventurers went in search of natural resources down to the very heart of the equatorial region. By the end of the century almost all places in the world had been mapped. The Antarctic remained a big mystery. The icy temperatures and the fickle weather conditions made it very hard or even impossible for the few who dared.

Starting in 1875, King Leopold II sent one expedition after the other to Central Africa and managed to acquire the huge area called "Congo" at the Berlin Conference in 1884. Every young man in Belgium looking for adventure could find something to his liking here.

But the young Adrien de Gerlache did not want to go to Africa but to Antarctica. The stories of the legendary voyages of discovery of James Cook, Fabian Thaddeus von Bellinghausen, James Wedell and James Clark Ross had inspired him to undertake a major scientific expedition on the basis of the latest research techniques.

II

The Raversijde Domain came into existence in the early 20th century on the initiative of the Belgian king Leopold II. It was one of the projects he financed with profits from Congo. Around 1900 the small kingdom of Belgium was one of the top five countries in the world in the field of industry, trade and finance. It also played a prominent role in the field of science. The Antarctic expedition of 1897-1899 under the command of Adrien de Gerlache boosted the image of the country even more.

III

Adrien de Gerlache de Gomery and Emile Danco set off for Norway in search of a suitable vessel for the Antarctic expedition.

In Scandinavia ships could be found that had proved their seaworthiness in the Arctic and Antarctic. By equipping a second-hand ship the expedition would be operational more quickly. De Gerlache eventually opted for the Patria, an elegant three-master with steam engine which was used for hunting seals and whales. After long negotiations de Gerlache managed to buy the ship. The ship was renamed the "Belgica" on 5 June 1896.

The vessel was subsequently converted into a genuine research and expedition ship on a Norwegian wharf.

In the mean time de Gerlache learned to ski and was able to test all kinds of expedition material. The required repairs were carried out, the skin doubled to prevent shipworm damage and the hold fitted with cabins and labs for the scientists.

In the summer of 1897 the Belgica was in the port of Antwerp and ready for departure.

1. Technical fiche.
2. On 5 July 1896 the Osterrieth family received a telegram announcing that the Patria had been renamed the Belgica and that the Belgian flag had been hoisted.

IV

The Belgica expedition was a large undertaking. The cost estimate de Gerlache made in 1895 amounted to 270,000 Belgian francs. Journalist Johan Lambrechts and an economist calculated that the Belgica project would have cost 8.6 million euro (68,873,000 Norwegian Kroner/5,849,722 Pound Sterling) in 2007.

The organisation required a strong marketing strategy so as to mobilise generous donors. The Royal Belgian Geographical Society looked for funds by means of a national subscription. Adrien de Gerlache managed to win wealthy businessmen and industrialists over to his project. But the man in the street was also invited to contribute to the expedition by participating in a Venetian party or by making a paid visit to the quay.

The expedition may have been even more difficult from a logistics point of view. Conditions in the polar region are unpredictable and there is always the risk that the ship gets caught in the ice. This means that sufficient amounts of food, medicine and equipment had to be taken on board by way of precaution. The experience gathered by Nansen, Amundsen and Cook with regard to polar regions was very useful for the composition of the polar equipment.

3. The 'Société Royale Belge de Géographie', which provided financial support to the enterprise, organised a collection among the population. Donors received a subscription certificate for their support to the Antarctica expedition. Thanks to massive support from the population the expedition could eventually set sail.
4. The linen; a distinction was made between mattresses for officers and mattresses for the other crew members.
5. The expedition depended on gifts for the interior decoration of the ship, such as these 100 francs for the purchase of chairs and a washbasin.
6. Receipts were carefully recorded.
7. Just before departure it was possible to visit the Belgica. Admission tickets once again generated part of the required funds.
8. The bill of a large warehouse with indication of games and smoking materials intended for the people on board the Belgica. Relaxation on board was of major importance.
9. A receipt for the purchase of furniture for the ship.
10. Amundsen confirmed the receipt of two accordions. A barrel organ and an accordion were used to have some music on board.
11. Until the very last moment before departure festivities were organised to provide for the financing of the project, 'to cover the travelling costs'. The Venetian party in the city park was organised with the assistance of the city council and the army but also of the Antwerp gymnastics clubs and cycling associations.

V

Contrary to many other explorers, who often strived for adventure or profit, the purpose of the participants of the Belgica expedition was to conduct genuine scientific research from the very beginning.

Apart from Norwegian and Belgian sailors the crew consisted of an international group of scientists and explores who laid the foundations for polar research.

Adrien De Gerlache (Belgian), expedition leader and captain

Georges Lecoq (Belgian), deputy expedition leader, lieutenant, hydrographic and magnetic research.

Roald Amundsen (Norwegian), sublieutenant

Jules Melaerts (Belgian), lieutenant

Emile Danco (Belgian), magnetic research

Emile-Gustave Racovitza (Romanian), zoologist and botanist

Henrick Arctowsky (Pole), oceanographer and meteorologist

Antoine Dobrowolsky (Pole), meteorologist

Frederick Cook (American), doctor, anthropologist, photographer

Henri Somers (Belgian), first marine engineer

Max Van Rysselberghe (Belgian), second marine engineer

Gustave-Gaston Dufour (Belgian), sailor

Ludvig-Hjalmar Johansen (Norwegian), sailor

Engelbret Knudsen (Norwegian), sailor

Johan Koren (Norwegian), sailor, zoology assistant

Louis Michotte (Belgian), sailor, cook

Jan Van Mirlo (Belgian), sailor

Adam Tollefsen (Norwegian), sailor

Carl-Auguste Wiencke (Norwegian), sailor

12. In the glass case (MAS/scheepvaartmuseum): the coat of arms that decorated the stern of the Belgica, the steering wheel of the Belgica, a telescope of the Belgica-expedition, a level with the inscription 'Expédition Antarctique'.

VI

The Belgica left on Monday 16 August 1897 amid great interest from the Antwerp public. The marketing campaign turned the departure into a major event. Thousands of people were standing on the quays to say goodbye.

The expedition also received international recognition and sympathy. When the Belgica was in Dutch waters it was greeted by the prestigious battleship Kortenaer with 21 cannon shots on behalf of Princess Wilhelmina.

Shortly after, however, the Belgica had to call at the port of Ostend because of steam engine trouble. The Belgica moored close to the royal yacht and this persuaded King Leopold II, who was not really an advocate of the project, to visit the expedition vessel after all.

The ship could once again set off in the direction of the Antarctic on 22 August.

13. The Antwerp yacht club also participated with a festive meal. Lecoinge, de Gerlache and Arctowski signed the menu.
14. On the occasion of the departure a beautifully illustrated certificate was signed by the people on board and the financiers.
15. At the time of departure the 'Société Royale Belge de Géographie' organised an escort with the steam vessel 'Emeraude'
16. The Belgica under steam. The three-master had a 35-hp steam engine on board. On the high seas the ship was sailed to save fuel.
17. The Belgica on the River Scheldt. In the background the Dutch battleship Kortenaer is shown, which saluted the departure of the Belgica with 21 cannon shots.
18. Adrien de Gerlache informed his patroness Léonie Osterrieth that he had to call at Ostend shortly after departure due to damage to the steam engine.

VII

At the end of the nineteenth century an Antarctic expedition was a great adventure.

The Belgica was equipped with a steam engine and had an iron-reinforced bow and keel, but in the waters around Antarctica one nevertheless had to rely solely on the knowledge and experience of the captain and his crew. Sudden weather changes, treacherous cliffs and drifting ice floes are still dangerous today in spite of the broad knowledge we have acquired.

At that time there were almost no maps of the South Pole. In addition, the horizontal vorticity of terrestrial magnetism decreases as one gets closer to the Pole and this disturbs the compass. It goes without saying that there was no satellite navigation (GPS) but radio communication wasn't there either. The first long-distance connection (between England and America) was made as late as in 1901.

In the time of Adrien de Gerlache there were also no permanent bases that could offer assistance in case of an accident or breakdown. Once civilisation had been left behind in South America they only had themselves to rely on while, between 1897 and 1899, family members, friends and enthusiast fellow countrymen could only make guesses as to their doings and goings, their life or death.

VIII

The last part of the journey threatened to end in disaster. The incomplete maps of the South-American coastline did not tell much about the islands, reefs or coastal depth and the Belgica consequently got stuck on a reef.

Depth measurement was performed by means of a plumb line, which required the ship to lay still. The more convenient echo sounder was only invented shortly after the disaster with the Titanic in 1912 by Alexander Behm with a view to tracking icebergs. The device did not really help to find icebergs but it turned out to be a fine instrument to measure the depth of the sea floor. Behm took out a patent on his echo sounder in 1913.

The Belgica only just managed to get afloat again and was able to continue its journey to the Antarctic.

After crossing Drake Passage, the dangerous sea between the American and the Antarctic continent, the Belgica reached the Antarctic coast in January 1898 and the scientific work could begin. The powerful storms that frequently sweep through the area caused the death of the Norwegian sailor August Wiencke, who was thrown overboard by a wave.

The expedition managed to map the entire area of the 200km long Gerlache Strait and to provide it with 'Belgian' place names during the first few weeks.

In early March 1898 the Belgica got trapped in the ice of the Bellingshausen Sea. The Belgica, which would float along with the ice in which it was stuck for 13 months, was prepared for the Antarctic wintering. It pretty soon became clear that in spite of the numerous scientific experiments and the many daily tasks in and around the ship, boredom and the darkness of the Antarctic winter would become the crew's greatest enemies.

19. The crew of the Belgica collected snow to make drinking water.
20. The rigging covered with ice and snow.
21. The Belgica in the pack ice; the deck covered by snow.
22. In the glass case: objects used in Antarctica during the Belgica-expedition (MAS/Scheepvaart-museum): a pair of wooden skis, a sledge, a pair of iron snowshoes, a pair of wooden snowshoes, four harpoons and a metal saw.

IX

It was originally the intention that the Belgica would call at the southern ports in winter. When the Belgica got trapped in the ice, an unexpected phase in the expedition began. Staying in Antarctica under such conditions was very hard, both physically and mentally. Emile Danco, only 28 years old, died of a heart condition. Many people on board suffered from mental disorders such as hysteria, schizophrenia and paranoia, which all disappeared after the long winter period. The Antarctic winter proved fatal for Adam Tollefson. The expedition left the Norwegian with a permanent mental disability.

The arrival of spring brightened the hopes of the expedition members and sunshine lifted the spirits. But even during the Antarctic summer the ice did not melt as was expected and hoped. The crew of the Belgica only managed to free the ship in the late summer, more exactly on 14 March 1899, 13 months after the ship got stuck in the ice. After a few weeks the family and friends of the expedition members received word of the success of the mission. Some time later the death of two members was announced.

23. The crew tried to free the Belgica from the pack ice with physical force.
24. A framed picture offered by Lecointe with the telling inscription: 'Last efforts to escape from the pack ice in March 1899.'
25. On 6 April 1899 Léonie Osterrieth was able to forward the fortunate news on the arrival in Punta Arenas, Tierra del Fuego, Chile, to Norway.
26. The good news on the scientific results was coupled with the bad news regarding the deaths of Wiencke and Danco.

X

The Belgica arrived in the port of Antwerp as late as on 5 November. The news of the successful expedition, which had reached Belgium in dribs and drabs, mobilised the entire population. The arrival of the ship was a true triumph. De Gerlache and many other expedition members became international celebrities.

During the following years the expedition members had their hands full processing the many research data. The challenge of the International Geographical Congress held in London in 1895 had been met and the objective of the young Adrien de Gerlache had been reached: before the end of the century an expedition would succeed in performing pioneering scientific work in the Antarctic.

The Pole **Arctowsky**, who was the scientific leader of the expedition, continued his scientific career in the United States and in Poland. He ended his career at the Smithsonian Institute in Washington.

His assistant Dorowolski later became the Director of the Polish Meteorological Institute.

The Norwegian **Amundsen**, who gained much experience as a sub lieutenant, was eventually the first to reach the geographical South Pole in 1911.

The American **Cook** was of crucial importance during the journey in his capacity as doctor and photographer. His experiences were published and were very well received. He probably received the most attention because of his claim that he had reached the North Pole in 1908. It is now generally accepted that it was in fact Amundsen who did this in 1926.

The Romanian **Racovitza** was appointed vice director of a French scientific institute after the expedition and later on became professor at Cluj University in his native country. He became one of the founders of biospeleological research.

Lecoq was appointed Director of the Royal Observatory of Belgium in 1900.

And **last but not least, De Gerlache** served as adviser for various expeditions and for the Belgian government. He was eventually appointed General Director of the Marine Affairs Institute. The expedition was immortalised with his travel story "Voyage de la Belgica: Quinze mois dans l'Antarctique".

27. Commemorative card with the officers and scientists of the Belgica expedition.
28. Like the departure from Antwerp, the return of the ship was celebrated exuberantly by the people of Antwerp. The Antwerp yacht club offered a festive banquet.
29. After the return the city of Antwerp organised a solemn reception in the city hall.
30. The city council also created a beautifully illustrated certificate for this occasion.
31. The crew of the expedition proposed to change the name of the Belgica Strait to the Gerlache Strait.

XI

The irrepressible urge of many adventurers to undertake revealing journeys is part of the nature of man. Although Adrien de Gerlache was certainly also tempted by adventure, he organised the expedition of the Belgica as a true scientific mission.

The efforts made to equip the ship for all kinds of scientific observations as well as the participation of leading scientists gave this voyage of discovery a sound scientific reputation.

Critics minimise the relevance of the first wintering on the Antarctic but it is not possible to be modest about the work of the scientists.

The flora and fauna of Antarctica were thoroughly inventoried. Not only the known living species were studied in great detail but hundreds of new species were discovered and published as well.

The meteorologists performed pioneering work as regards weather conditions in the Antarctic and specifically with regard to the Antarctic winter.

In the field of geography, sea depths were measured and a detailed map was made of the peninsula for the very first time. Geomagnetism was also studied with the latest techniques for the first time.

In addition, soil samples were taken, which resulted in significant discoveries.

The experience gained during this expedition was furthermore crucial for subsequent trips to the Polar Regions.

32. In the years following the return the research was published in a wide range of scientific reports.

XII

In three years' time the former fishing vessel Patria became one of the most famous ships in the world: the Belgica.

At the time of the financial settlement of the expedition there was a deficit. Adrien de Gerlache managed to transfer the ship to the Belgian government so as to make up the remaining amount. However, the government did not seem to care for this exceptional piece of maritime heritage: the Belgica gradually fell into decay in the port of Ostend.

Together with some investors Gerlache managed to get the ship to sail again as an expedition ship but also as a whaler. At a certain point in time the ship became the property of Philippe, Duke of Orléans, who also used it for expeditions.

33. After the Antarctic expedition the Belgica was left abandoned. Only as late as in 1901 was the ship used again for an expedition in Arctic waters but also for whale hunting. Other expeditions followed in 1905, 1907 and 1909 under the guidance of Philippe, Duc d'Orléans. This 1905 picture shows the Belgica moored at the second trading dock in Ostend.
34. In the glass case: part of the replica of the saloon of the Belgica (Henri de Gerlache), a washbasin of the Belgica (MAS/Scheepvaartmuseum), bird's nest of the Belgica (MAS/Scheepvaartmuseum).

XIII Belgica becomes Isfjord becomes Belgica

The Belgica returned to Norway in 1916. The ship was renamed 'Isfjord' and was converted in order to transport coal and passengers between Spitsbergen and the north of Norway.

This period of coal transport ended as early as in October 1916: after only five trips to Spitsbergen the coal company realised that it needed a more modern ship and decided to sell the Isfjord. For the purpose of this sale the ship was dismantled so that all components could be offered for sale separately.

The hull, steam engine and moorings were bought by Kristian Holst in autumn 1918. He renamed the ship Belgica again and had it converted into a floating fish-processing company. From then on the Belgica made trips to the Lofoten islands in the cod season (January-March). Outside the fishing season the ship was moored in Harstad, where it was used to store fish products.

After the removal of the main engine the ship was once again used to store and transport coal in the late 1930s.

35. The 1916 plans for the conversion into the freight and passenger vessel Isfjord and the home of the director of the Isfjord-company. In autumn 1918 Kristian Holst converted the ship into a sailing fish-processing company.

XIV The Belgica as ammunition depot

On 9 April 1940 the German army attacked Norway. In May an allied force consisting of Norwegian, British, Polish and French soldiers managed to temporarily drive the Germans back in the direction of the Swedish border in Narvik.

The British who had landed in Harstad for this operation confiscated the Belgica, which was moored there, and filled it with ammunitions for the front. For security reasons the Belgica as well as a second ship loaded with explosives were towed to Brurvik, a long way from Harstad, where they were both brought to anchor.

There are two theories with regard to the sinking of the Belgica and its sister ship: the first theory suggests that there was a German air strike; the second theory states that both ships were deliberately sunk to prevent the Wehrmacht from capturing the explosives.

The fact that both ships lie upright on the sea bottom points in the direction of the second view.

36. Divers of the local diving club started exploring the wreck of the Belgica in 1990. From top to bottom: boxes with dry gun cotton in the hold of the Belgica, boxes with wet gun cotton in the

hold of the Belgica, the bow of the metal ship located next to the Belgica, boxes with explosives in the hold of the 'sister ship'

XV Renewed interest in the Antarctic.

After the first Belgian expedition to the Antarctic Belgium gained a certain reputation in the field of Antarctic expeditions.

Gaston, Adrien de Gerlache's son, followed his father's example with the organisation of a major expedition in 1957-1959. Partly because of this, Belgium was one of the twelve countries that signed the Antarctic Treaty in Washington in 1959. This Belgian expedition took place on the occasion of the International Polar Year and resulted in the foundation of the King Baudouin base in Queen Maud Land at 70°26 south latitude and 24°18 east longitude.

This was followed by an expedition led by Frank Bastin in 1959-1960 and an expedition led by Guido Derom in 1960-1961. Tony van Autenboer remained in the Antarctic for the entire duration of both expeditions. After a short interruption 3 additional expeditions took place between 1963 and 1967 in cooperation with the Netherlands. After these expeditions the King Baudouin base was permanently closed. From 1968 to 1970 three summer expeditions were organised in cooperation with South Africa.

Afterwards it would take until 2007 before Belgium opened a new scientific research base: the Princess Elisabeth base, located 180km to the south of the former King Baudouin base.

However, Belgian scientists have not been idle in the mean time. Many researchers joined foreign expeditions or got the Antarctic in the news in another manner. Polar sailor Willy de Roos, who was the first to circumnavigate both North and South America in a single journey, made a third polar trip with the Williwaw in 1982-1983 so as to draw attention to the environmental problems of Antarctica. Rudy Van Snick climbed Mount Vinson in 1995 and the Ellsworth Mountains in 2000. In 1997-1998 Dixie Dansercoer and Alain Hubert made the 3900km long trek across the continent without external help. The yacht Euronav Belgica followed the original route of the Belgica and of the Williwaw under the guidance of Dixie Dansercoer in 2007-2008 in order to draw attention once again to the Antarctic.

37. Sixty years after his father Gaston de Gerlache organised a new Belgian expedition to Antarctica.
38. The famous sailor Willy de Roos with his story on the third polar trip of the Williwaw. The Williwaw, the first ship to circumnavigate both North and South America in a single journey, is now part of Flanders' nautical heritage
39. The Belgian presence on Antarctica reaches a new climax with the construction of the Princess Elisabeth Base and the trips of the Euronav Belgica and the Polar Star.

XVI The Belgica rediscovered in 1990

In 1990 divers of the local diving club 'Harstad Dykkerklubb' discovered the wreck of an approximately 30m long wooden ship in Brurvik Cove some 100m off the coast. The wreck was soon identified as the Belgica on the basis of the cast-iron decoration on the bow and other elements.

Kristian Holst, the last owner, had already donated one of the original anchors of the Belgica to the Polarmuseet in Tromsø. It can still be seen at the entrance of the museum.

In an article for the internationally renowned scientific journal 'Polar Record' Kjell Kjaer described the fortunes of the Belgica from its construction to its sinking (1884-1940). As a result of the publication of this article the discovery from 1990 became known in Belgium in 2005 and immediately encouraged a group of interested persons to establish the Belgica society.

40. The nameplate of the Harstad diving club.
41. The Holst Family is still active in the fishing industry in Harstad.
42. An anchor of the Belgica donated to the Trømso museum by Kristian Holst.
43. A diver of the Harstad diving club above the wreck.

XVII The Belgica Society in action

The Belgica Society was established in the summer of 2006 by Willy Versluys, an Ostend ship owner fascinated by maritime history. Its major objectives are: studying and documenting the shipwreck of the Belgica as adequately as possible, if possible raising it to the surface partially or in its entirety so that it can be presented to the public at large (in Norway or in Belgium) and at the same time figuring out the entire history of the Belgica as completely as possible.

Shortly after its formation the Belgica Society became the owner of the wreck thanks to the generous gift of the ship by Mr Kristian Holst, the heir of the last owner.

Since the summer of 2006 close contacts have been established with numerous other interested parties in Norway, such as the archaeological authorities, the port authorities, the Harstad District Museum, the Harstad Diving Club and the Norwegian navy.

- 44. A part of the Norwegian connection: Kjell Kjaer and Rudy Caeyers in Harstad, February 2008.
- 45. A team of Karl Rikardson monitors all activities of the Belgica society first-hand, August 2007.
- 46. Jan Lettens after a dive to the Belgica with the Anna Rogde in the background, February 2008.

XVIII The wreck site in pictures

Multibeam and *Side Scan Sonar* images, taken from a research vessel, offer an overall picture of the wreck site. These techniques based on the sending and recording of acoustic signals are mainly used to trace and map obstacles for shipping traffic and to map the seafloor topography.

Apart from the techniques giving an overall picture of the wreck it is also important to register the site through underwater measurements and to locate all remains and objects in detail.

Underwater pictures may provide detailed images whereas the limited visibility underwater often prevents the realisation of an accurate overall image of the wreck. Sea organisms, concretions and corrosion around objects often complicate matters as well.

- 47. Schematic representation of a ship with an active multibeam.

XIX Multibeam image of the Belgica and the wider surroundings

The Belgica Society had a detailed contour map made of the wreck of the Belgica and the wider surroundings in 2007. This made it possible to register the exact position of the Belgica as well as any large objects located in the immediate vicinity of the wreck. These objects could provide additional clues to why the ship sank in May 1940.

During this mapping process the exact position of the wreck of the Belgica was determined and the detailed topography of Harstad Bay was measured but on top of all that, a second wreck site was discovered some 50-60m to the north of the Belgica.

It concerns the wreck of a steel ship also loaded with explosives at the time of sinking, just like the Belgica.

- 48. Recording of the topography of the wreck and its surroundings by means of a multibeam.

XX Making the wreck visible

The fore of the Belgica was covered with large pieces of fishing nets reported to have caught on the wreck in the 1960s. These nets were full of mussels and were also an ideal habitat for kelp, a kind of seaweed normally growing on rocky bottoms.

Almost nothing of the fore was visible until most of the pieces of fishing nets were removed in the summer of 2007 and were laid out next to the wreck.

49. Wim Vermeire removes some of the nets covering the wreck, August 2007.

XXI Length, width, height

In order to be able to adequately compare pictures of a shipwreck with the available plans of the ship in question it is necessary to take various measurements on the ship, e.g. by means of a tape measure. This enables identification of certain components of the wreck on the basis of the corresponding parts on the plans.

Registration of the different depths at a wreck site and especially the variations makes it possible to find out up to what level the ship has been preserved: up to the deck level or only up to the hold level?

50. A plastic tape measure is used to take measurements systematically.

XXII Picture of the Belgica taken in February 2008

When underwater visibility allows, a wreck site can be photographed perfectly provided the correct photographic techniques are used.

In February 2008 underwater visibility in the area of the Belgica wreck was over 20 metres, which made it possible to make a first clear overview image of the wreck.

The photos made at that time provide a sharp instantaneous image of the wreck and ensure that non-divers can also have a clear picture of the Belgica.

By comparing these high-quality images with the available plans from the early 20th century we were able to gain new insights into the building chronology of the ship.

51. The remaining supports of the starboard bulwarks.
52. The rudder and the starboard side of the Belgica.
53. View of the starboard side of the Belgica.
54. Wim Vermeire between the rudder and the stern, February 2008.
55. The Belgica Society can make use of the Anna Rogde, a schooner from 1867, February 2008.
56. Photomosaic of the wreck, made by Nicolas Mouchart.
57. From left to right: View from above of the wreck of the Belgica, near the stern, Steel superstructure with portholes, View from above of the wreck of the Belgica, approximately amidships.
58. In the glass case: Some copper alloy components from the Belgica presented by Norwegian divers. Part of a leather boot from the hold of the Belgica; it is unclear whether the boot belonged to a Norwegian or English soldier.

XXIII The wreck and the cargo

Although the wreck has rested on the bottom of a Norwegian bay for 68 years, many ship components are still clearly visible: the rudder, parts of the deck, a large coaming, a steam-driven winch, a steel superstructure with portholes on the fore, a ventilating shaft next to the wreck, a manually operated windlass on the fore, one of the anchors and the bowsprit.

The top of the windlass features the name of the manufacturer : 'G. & J. McOnie, Makers, Greenock'. Established in Greenock (Glasgow), Scotland, this company was certainly active in the beginning of the 20th century and had a patent for making windlasses. This means that the windlass on the wreck may date back to the time of Adrien de Gerlache.

Near the steel superstructure on the fore a lot of coal can be found, probably the remains of boiler fuel. The cargo mainly consists of boxes containing explosives. Two types can be distinguished: brick-shaped blocks with central perforation (wet guncotton) and cylinder-shaped shells filled with black powder (dry guncotton).

- 59. A windlass.
- 60. The rudder.
- 61. Dry guncotton.
- 62. Wet guncotton.

XXIV In situ measurement of the state of preservation of wood

To successfully preserve wood in situ it is desirable to know whether archaeological wood is structurally strong enough to cover it for instance with sand to prevent the action of wood boring organisms. Knowing its state of preservation will also enable conservators to assess the optimal conservation process in those cases where it may be decided to raise it.

The density of waterlogged wood is a good parameter to assess its state of preservation. As more of the wood cell is degraded by micro-organisms the density decreases.

A method for in situ determination of density of waterlogged wood in marine environments was developed by the conservation department of the National Museum of Denmark. This method is based on measuring the electrical conductivity of the wood.

In the summer of 2008 the Belgica-society, in collaboration with specialists from the National Museum of Denmark, will apply this method on the Belgica wreck.

- 63. Testing the measurement of electrical conductivity of wood underwater, Brede, November 2007.
- 64. Apart from conductivity measurements wood samples are taken with a view to laboratory research. These samples are carefully packed for transport.

XXV Deterioration of wood in the marine environment

One of the main threats to submerged wood lying exposed on the seabed comes from woodborers like shipworm (*teredo navalis*) and gribble (*limnoria lignorum*). They simply eat themselves through the wood. Through an understanding of the ecological requirements of the wood boring organisms, hot spots of where they are likely to thrive can be identified.

Even when wood is buried in sediments it deteriorates, albeit at a much slower rate. This is caused by the action of micro-organisms such as fungi and bacteria. The main bacteria causing deterioration has not yet been formally identified.

- 65. The wood is also affected by physical and chemical degradation processes.
- 66. Detailed picture of a wooden element of the Belgica with perforations caused by wood borers.

XXVI Dendrochronology

Wooden objects can often be dated on the basis of dendrochronology by means of the difference in thickness of the annual growth rings. First the type of wood needs to be determined. In the case of oak dating data up to at least 10,000 years back are already available. The place of origin of the wood and the age of the tree used can also be derived from the dendrochronological study.

- 67. Schematic representation of a reference curve (left). Cross section of a wooden board with a number of perforations of biological origin (right).

XXVII Analysis of two wood samples from the Belgica

The kind of wood and the growth ring pattern of a wooden beam and a deck board were studied. Both are made of softwood. A cross section of the beam and the board shows 69 and 44 growth rings respectively. The investigation is still going on, which means that it is still unclear when the trees were cut, and in which region.

68. In the display case: Coal from the wreck of the Belgica and coal from a Spitsbergen coal mine.
69. Copy of the capstan of the Belgica by Ronny Clibouw.

XXVIII The wreck of the Belgica: an oasis of marine life

Like many other shipwrecks in the sea, the wreck of the Belgica is an oasis of animal and plant life. Here we show you some of the numerous residents of the Belgica. They were identified by Tiny Heremans (Catholic University of Leuven).

Apart from their archaeological value, wrecks are also worth observing on account of their biological abundance. This indicates that the border between culture and nature can be very thin.

Lumpsucker (*Cyclopterus lumpus*)
Ling (*Molva molva*)
Common Starfish (*Asterias rubens*)
Edible Sea Urchin (*Echinus esculentus*)
Vase Tunicate (*Ciona Intestinalis*)
Mussel (*Mytilus edulis*) and
Squat Lobster (*Galathea squamifera*).

70. An Edible Sea Urchin.
71. A Squat Lobster.
72. A Common Starfish.
73. A Lumpsucker.

XXIX The use of archaeological investigation of a wreck with a known history

First of all, the full history of a ship is never known. For example, did the Belgica sink during an air raid or did the crew sink the ship to keep the explosives out of enemy hands? The wreck remains may hold the answer to this mystery.

Another equally important element is that our extensive knowledge of the Belgica may enable us to check how this history translates itself in the wreck remains. This information will be of great importance for future investigation of the majority of the shipwrecks of which we know considerably less or the identity is even unknown.

In this manner the Belgica can once again play an important role, this time in the field of maritime archaeology.

XXX 1990-2005: the wreck partially dismantled

Since the rediscovery in 1990 divers have removed numerous objects from the wreck site, ranging from a large anchor over portholes and ammunition boxes to various smaller objects, mostly made of copper alloys.

This anchor was donated to the Belgica Society by the local diving club in 2006 and all kinds of other objects originating from the wreck site have since then been put at the disposal of the Belgica society with a view to research. Indeed, it is becoming increasingly clear to everyone that these objects also tell part of the history of the ship.

All available information is essential to solve the archaeological puzzle as far as possible back in time. Due to natural decay a large number of pieces of the puzzle are already missing.

XXXI An anchor of the Belgica

Divers from the Harstad area have explored the wreck of the Belgica in the last couple of years and salvaged some artefacts.

The largest artefact recovered so far is probably the anchor. It was exhibited for many years near the headquarters of the diving association. When owner Christian Holst offered the wreck to the Belgica So-

ciety, the anchor was offered as well. The Maritime Archaeology and Nautical Heritage cell of the Flemish Heritage Institute took care of the anchor so that it can be exhibited again after conservation.

The anchor was found next to the wreck. It is a stock anchor, which was still the most frequently used type of anchor at the end of the nineteenth century. This type had steadily evolved over time. It came into existence many centuries ago and was already depicted in Greek antiquity. It was also a symbol of hope in early Christian symbolism. The stock anchor became the main symbol of the shipping industry.

Due to the rapid evolution of the shipping industry the anchor also underwent a significant transformation in the nineteenth century. Before the nineteenth century the stock was made of wood. In the nineteenth century it was replaced by an iron bar. In addition, new variations such as larger curvature of the arms were created thanks to new forging and melting techniques.

Eventually the stockless anchor was introduced. But in spite of the introduction of more modern anchors the large, heavy stock anchor like the one recovered from the Belgica has remained a useful and safe attribute.

A ship had several anchors on board. The heaviest anchors, such as stock anchors, were used in special situations, such as anchoring during very hard weather conditions or in a strong current.

XXXII Conservation: the key to qualitative research

Below the surface objects have often achieved a more or less stable balance with their surroundings. When they are recovered from the water and placed in a drier location with a higher oxygen concentration their conservation condition immediately starts deteriorating unless they are given adequate treatment.

Below the surface the deterioration of these objects depends on numerous factors, such as the material of which they are made but especially their specific location. In the sea the degree of acidity, the salts, the oxygen present in the water and fauna and flora all play a destructive role. For example, numerous metal objects change gradually through corrosion and all objects become impregnated with salt. The corrosion mainly affects the surface, and it is precisely on the surface of objects that the major part of the archaeological information can be found, such as a mark, a master stamp or finishing layers.

The first step to conservation is the removal of salts and corrosion. After desalination – in the case of metals in a chemical bath – the objects are in most cases cleaned mechanically. The remaining corroding objects are then stabilised by means of chemical products and provided with a protective layer to prevent further decay.

Objects made of organic materials have to be impregnated with substances preventing shrinkage and cracks before they can be dried.

XXXIII What next?

What to do with a wreck with great international symbolic value such as the Belgica, which will disintegrate completely in the medium term if no action is taken?

1. We could reconcile ourselves with the steady decay of the ship in the knowledge that all useful information has been extracted from the wreck during the investigation.
2. We could try to prevent further decay in situ by taking protective measures.
3. We could lift and preserve representative parts of the wreck so as to show them to the public in an appropriate manner.
4. We could lift and preserve the entire shipwreck so as to show it to the public in an appropriate manner.

Barring the first option, all possibilities require substantial efforts and financial means. A good cost-benefit analysis will certainly be required before a decision can be taken on this matter in consultation with the Norwegian authorities.