

The Bom Jesus Shipwreck

Discovered near Oranjemund on 1 April 2008

Jasper House Museum
Oranjemund





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<p>DATE</p>	<p>JULY 2024</p>
<p>PLAN NO.</p>	<p>Drawing Office/DRAWING OFFICE/REQUIREMENTS/2024/010407/ND06/MA1-BL/S0-202407-001</p>

The story of the Bom Jesus

The Bom Jesus was part of a flotilla of four Portuguese ships that set sail from Lisbon, Portugal, on the 7th of March 1533. She was a brand new three masted *nau*, captained by Dom Francisco de Noronha, developed specifically for plying the new ocean trading routes between Europe and India. Somewhere in the Atlantic Ocean, near the equator, after a stop-over at the Portuguese colonial island of São Tomé, the Bom Jesus hit a squall and was badly damaged, reported lost by the rest of the flotilla. Until 2008 the sailing ship was presumed to have gone down in the mid-Atlantic off the coast of Tristan da Cunha.

On the 1st of April 2008 diamond mining operations at Namdeb were under way near Oranjemund on the coast of Namibia. Namdeb's mining process entails building sand sea walls and pushing back the sea hundreds of meters to mine up to 30 meters below the sea level on the ocean bedrock. During this process a dozer operator, Mr Kaapanda Shatika, noticed what he thought were pipes (later identified as cannons) and after the chief geologist, Mr Bob Burrell, saw strange semi-hemispherical rocks which were actually copper ingots, diamond mining was halted. With the threat of the sea wall collapsing due to heavy weather, excavation of the wreck began immediately under the direction of archaeologist Dr Dieter Noli. During the two major rescue operations that followed over 40 tons of cargo were excavated, consisting of thousands of gold and silver coins, tons of copper, zinc and lead ingots, and large quantities of ivory, navigational equipment, personal possessions, and the superstructure of the ship.

The varying provenances of the artefacts show a global trade network between different European countries, Africa and the Indian sub-continent. The entire collection is stored inside the mine, safeguarded by diamond mining's security measures, and under the management of the Namibian Ministry of Education, Arts and Culture. Today, the Bom Jesus is the oldest known and most valuable shipwreck ever discovered off the Western coast of Sub-Saharan Africa.

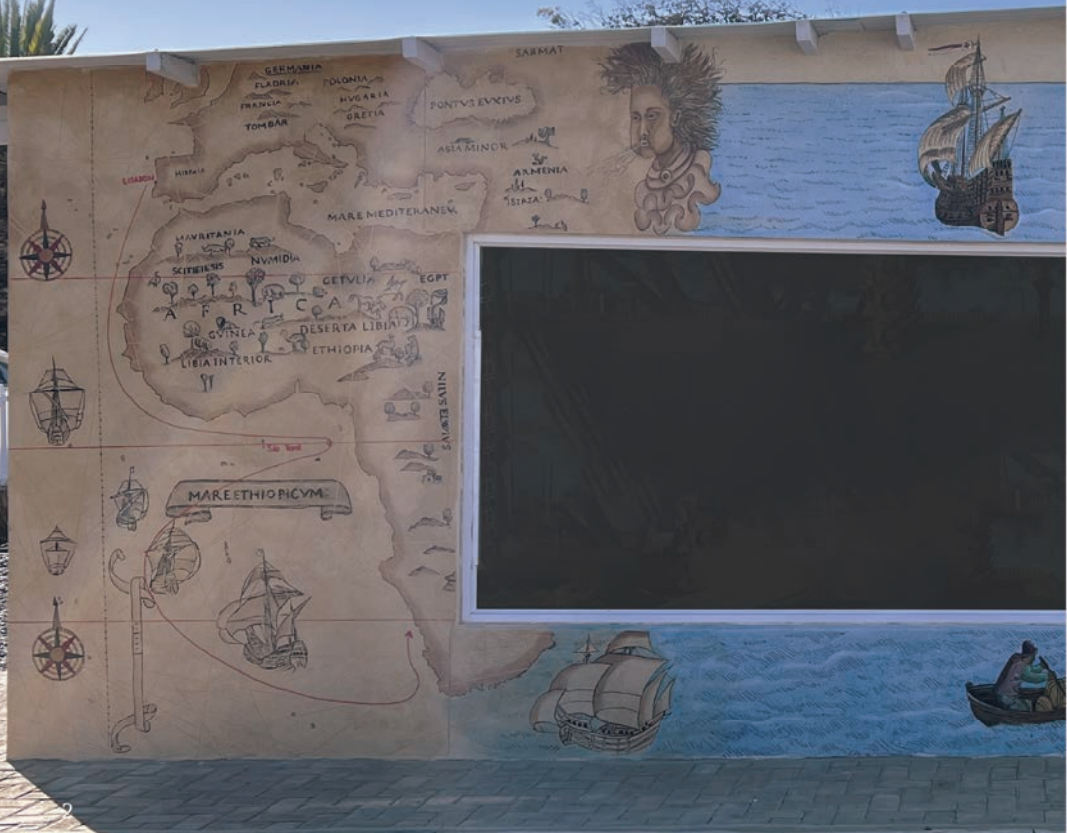


In 2024 a new room was added to the Jasper House Museum to exhibit information about the Bom Jesus shipwreck, and to celebrate an incredible piece of local history that links our small mining town of Oranjemund to global trade routes of the early 16th century. Local artists, Aurelia Sieberhagen, Immanuel Chiete and Wilma van Tonder were commissioned to paint a mural on the outer three walls to illustrate the voyage and fate of the Bom Jesus.

The first section of the mural is entitled **“The Bom Jesus Sets Sail”**

It depicts a typical Lisbon harbour scene from the 1500s where the Bom Jesus was loaded with cargo intended for trade with India and set sail from Portugal, on Friday, 7 March 1533, under the flag of King João III (1502-1557). It sailed in a flotilla of four vessels, heading bravely off into treacherous seas, hoping to return with spices and other treasures to save the uncertain fortunes of the king.

Her cargo consisted of various commodities like tin, copper and lead ingots, ivory, as well as mercury. Funding for the ship, as well as for most of the cargo,



was sourced from the Fuggers, a German family who were a prominent group of European bankers operating in Germany.

The left-hand side of the mural depicts a portion of the 1529 Diogo Ribeiro world map (the original of which is housed in the Vatican library) showing the route the Bom Jesus took, leaving Europe and sailing around the bulge of Africa to dock at the island of São Tomé. There she probably exchanged items such as jewellery for ivory tusks and continued her journey. Catching the easterly trade winds out into the Atlantic, she was then badly damaged by tropical storms over the equator and presumed sunk. Using her remaining sail power and drifting with the westerly winds she eventually hit a rocky outcrop off the coast of Namibia and sank, and there she lay for nearly 500 years.



The north facing wall of the mural is entitled “**Stormy Seas**” and depicts the sinking of the Bom Jesus.

The *nau* was a brand new state-of-the-art sailing ship, stable enough to withstand stormy weather and big enough to hold a large cargo. She probably had over one hundred crew members including specialists such as doctors, engineers and cooks. In her capacious hold she carried heavy cargo, and also jars of mercury. This was used to medically treat sailors on board, and intended for trading with India where it was used to make mirrors.

On this particular journey, whilst crossing the equator, the flotilla hit a squall. Since the Bom Jesus was a new ship the wood had not yet expanded properly and it was taking on a lot of water. In addition, the mercury was kept in earthenware pots in the hull, where sailors bailing water out of the hold would have been exposed to harmful mercury fumes. It is suspected that this caused them to be



unfit to “man the decks” during stormy conditions, to lower sails and take other preventative measures. The Bom Jesus was separated from the rest of the flotilla in the storm, lost two of her masts, and was presumed sunken in that location. However, as we now know, she was carried by the currents and wind back to the coast of Africa where she met her end along the stormy Skeleton Coast.

The *nau* had a life boat so it is possible that the crew left the sinking ship and made it to the shore. If they had then walked south for 20 kilometers they would have reached the fertile delta of the Orange River mouth and met up with early inhabitants of Southern Namibia. Since only one chest of gold was recovered from the wreck, a romantic tale of Portuguese gold in the desert is a tempting end to this tale. There is, however, currently no evidence of any survivors.



The final panel of the mural is entitled **“Sunken Treasures”** and depicts two scenes: one of the Bom Jesus slowly disintegrating on the ocean floor, surrounded by the rich sea life of the Namibian coast, and the final scene of the triumphant recovery of the most precious cargo by archaeologist Dieter Noli.

The ship foundered in stormy conditions on a rocky outcrop and landed heavily in a trench alongside it. The force of the heavy ship tipping over trapped an incredible number of valuable artefacts beneath it. Some of the recovered coins were bent into a “pringle chip” shape by the force of the collapse. The heavy timbers of the hull protected the cargo, while they themselves tell an amazing story of ship-building techniques from long ago.

500 years of storms and currents, of beach dwelling people occasionally picking up a piece of the wreckage, and of early explorers carefully keeping their distance from this treacherous coast passed by. For 500 years people wondered and surmised about the fate of the Bom Jesus, and the Portuguese king bemoaned the loss of his wealth.



The remote desert coastal areas of Namibia remained undisturbed until the late 1800s. Rapid changes came after the discovery of diamonds on the southern beaches in 1908, followed by the colonisation of Namibia first by Germany and then by South Africa, and independence in 1989. Diamond mining has continued along this coast for over 100 years and is now operated by a joint corporation of the de Beers Group and the Namibian Government, an organisation called Namdeb, which runs its operations from a small town called Oranjemund.

Namdeb's mining process includes building beach and sea walls and pushing the sea back hundreds of meters in order to mine up to 20 meters below sea level on the bedrock. It was during this process, on April 1st 2008, that miners noticed strange items on the bedrock and mining was halted, archaeologist Dr Dieter Noli was called to the site and excavation commenced. The rescue excavations yielded tons of precious cargo and rare navigational equipment among other fascinating items. The news of the discovery of the Bom Jesus spread around the world and eventually the final excavation involved archaeologists and experts from many different countries and provides us with an intriguing glimpse into the past.



Mining Process

Diamond mining along the coast of south-western Namibia has been active for the past 100 years. This is the result of diamonds from kimberlite pipes in the interior of southern Africa being transported along the Orange River to the Atlantic Ocean.

To increase land surface available for mining, beach accretion takes place by moving sand from the interior onto the beach and creating long sea walls to push back the ocean. This means that current activities take place below sea level, depending on a process in which overburden sand is deposited on the high-water line using dump trucks and conveyor belts. This allows submerged beaches to become accessible for diamond extraction using conventional land-based mining techniques. The extent of beach accretion since 2000 has been extended up to 500 m seaward, making substantial areas available to onshore mining.



An overburden of up to 30 meters of sand is then removed using bulldozers to expose gravel and bedrock. The bedrock typically contains well-developed gullies varying from less than 1 m to 7 m in depth where diamonds are found.

Once excavators 'hit bedrock' (i.e. the excavator bucket starts to scrape against the highest bedrock points) or encounter the first diamondiferous gravel, the stripping operation is complete, and bedrock teams then move in to start removing the diamondiferous gravel. This marine gravel is trapped in bedrock gullies and is exposed by the mining process.

The gravel is bulldozed into piles and then loaded onto trucks. Final clean-up of the remaining gravel from the irregular, creviced bedrock is done using large mobile vacuum cleaners ('transvacs') and hand lashing (i.e. using brushes to remove trapped gravel from bedrock trapsites). The gravel is then taken to processing plants where it is sized, sorted and put through a separation process and finally the diamonds are removed by hand.



Discovery



On the 1st of April 2008, a cold wind was blowing off the sea and Namdeb diamond mining operations were in full swing. During his usual task of scooping sand off the bed-rock, bulldozer operator Kaapanda Shatika noticed strange material on the bedrock that didn't look like it belonged in the setting, he thought they looked like long pipes and he immediately reported them to his supervisor. In fact, one of these pipes had already been accidentally scooped up and sent to Number 3 processing plant, blocking it up for days. Reports of strange items landing up in the diamond sorting trays had already circulated among the miners.

Meanwhile a small team of geologists had arrived at U60, a mining site in Mining Area 1 that was under-performing in expected diamond recoveries. Chief geologist Bob Burrell was aware that he would be questioned during a forthcoming visit from the De Beers CEO about the under-performance of the site and decided to take some photographs. He picked up a strange shaped boulder and realized it was a copper ingot, noticed some wooden spars and a few metal tubes and called his colleagues over. They surmised that the strange objects were part of a shipwreck and immediately asked the mining engineer in charge of operations at the site, Mr Gully Muteka, to halt mining operations and tape off the area.

The identification of the wreck would come later, but on that day, after nearly 500 years, the Bom Jesus was finally found!



Excavation

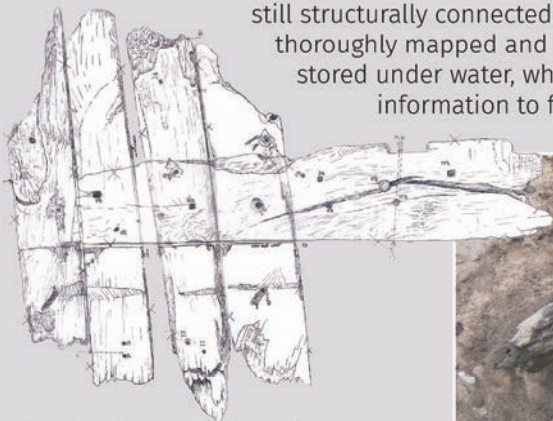
The area of the wreck of the Bom Jesus measures just 20 m x 25 m, at its eastern end a large rock projects up about 2 m. It appears that the ship struck the rock before settling down into the gully, where it broke up. The majority of the ingots were found to the west of the rock, further west was the concretion field, and west of the concretion field lay the artefact scatter field, where most of the artefacts other than the ingots – including the cannons, the silver and the gold – were concentrated.

The ship keeled over and disintegrated, dumping the heavier artefacts and those that were stored lower down in the hull into the concretion field. The lighter artefacts and those that were stored higher up in the hull were dumped into the artefact field, with the even lighter items scattered further afield. Two lead sounding weights – literally designed to sink to the bottom of the sea with utmost haste – were found on the south-western margin of the site. Seeing as their station would have been up in the bow, this suggests that the bow may have broken off. The huge “nag’s head” pulley block ended up 4.5 km from the wreck, at 2m above sea level.

What exactly the ship was doing at the time of her demise is not yet clear. The mariners with their navigational instruments would have had a good idea of where they were. It is surmised that the storm-damaged ship may have been driven north from the vicinity of the Cape until she anchored near the desert shore, after which she was driven ashore by bad weather. This assumption is based on the fact that most of the ships that went aground at the time did so by starting off at anchor in unfavourable conditions.

Wooden Remains

A Portuguese team of archaeologists had as their primary objective the excavation of pieces of the ship's hull, particularly those which were still structurally connected. These pieces have been thoroughly mapped and recorded and are now stored under water, where they could still yield up information to future researchers.



The blockhead of the mizzen mast had washed up on a mine beach a year before, complete with bronze bearings, a find which only made sense once the rest of the wreck had been discovered.

Of the three masts of the *nau*, only this section of the mizzen mast was found. An explanation of the mystery of the two missing masts is that they were cut free after breaking in the storm, a theory which is supported by an unusual find. A section of railing from next to the main mast was found lying on the seabed, underneath it was lying a piece of the mainstay which had clearly been cut.

This, together with axe marks on the railing, suggest that the main mast had gone overboard and then had to be cut free to stop it from damaging the ship.



On some of the pieces of salvaged wood, traces of white lead-based caulking paint is still evident.





Bronze bearing



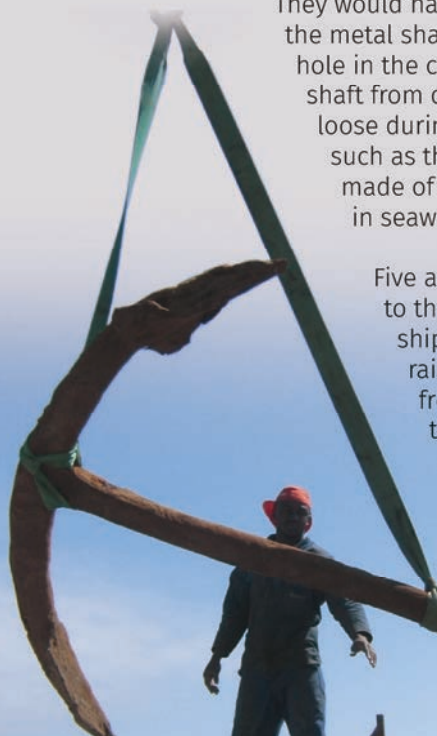
Nags-head Block

Ship Fittings

The Bom Jesus, being a newly built *nau*, was kitted out with state-of-the-art technology (much like a modern day space shuttle!). Many of the bronze fittings found included bearings of different sizes.

They would have been countersunk into wood, with the metal shaft of a pulley running through the hole in the centre, thereby preventing the same shaft from damaging the wood and working itself loose during use. Other pieces of equipment such as this Nags-head Block, although not made of bronze, survived by being submerged in seawater and buried.

Five anchors were found, not directly next to the ship as they would have been if the ship had been sailing with her anchors raised, but spread out at a distance from the main wreck site. This implies that the Bom Jesus had been at anchor when a storm drove her into the submerged rock.





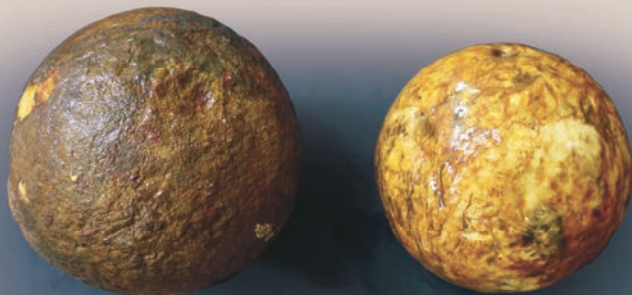
Cannons

The remains of four bronze swivel guns, two small bronze muzzle-loaders and two large bronze muzzle-loaders were excavated. Also found were two forged iron cannons, four cast iron cannons and seven iron cartridges or breach-plugs for breach-loading cannons. The bronze swivel guns had a breech length (without tiller) of 73 cm, a breech diameter of 25 cm, a barrel length of 188 cm and a distance between the forward end of the breech and the trunnions of 17 cm.


Some of these cannons were in general use on Spanish ships in 1535, a fact that also assisted archaeologists in the dating and identification of the Bom Jesus.

All the large cannon balls found with the wreck were carved from stone, while smaller cannon balls were cast from iron.

The large bronze cannon, which was still loaded with a stone cannon ball when it was found was usually mounted on the back or the front of the ship to shoot at chasers. It was always loaded and ready to shoot, it shot straight and fast and splintered on impact to ensure maximum damage.



Other Weaponry



The Bom Jesus had on board a number of smaller weapons too. The appearance of the practically intact musket stock, as well as the remains of at least half a dozen others, suggests that the weapons concerned were matchlocks. Some of these had octagonal barrels, while others had round ones. The fact that at one set was boxed suggests that at least some of them were trade items or military stores intended for India, rather than arms for the crew and the soldiers who were on board. These arms would be used for defence against pirates or mutineers.



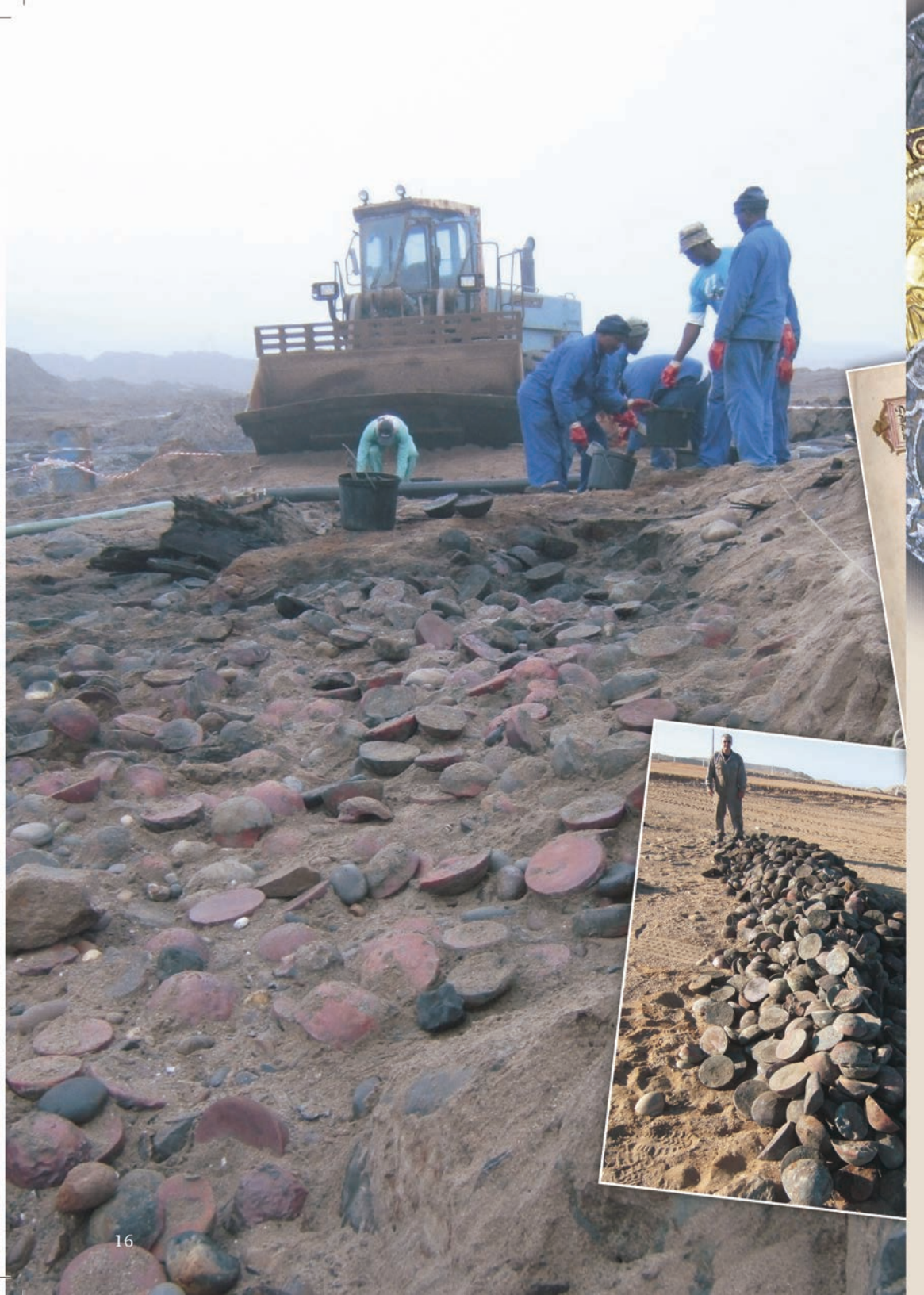
A well preserved powder flask was also found as was a chest of swordblades intended for trade as they were transported without their handles. The evidence suggested that all the blades on board had elliptical cross-sections, parallel cutting edges, spear-shaped points and shallow “blood grooves” (fullers) on either side. It also appeared that they had come in three scabbard-widths, these being 35 mm, 40 mm and 45 mm. One reasonably intact blade measured some 28 mm in width. That made them cut-and-thrust blades, rather than rapiers – which is about what would be expected for swords from the second quarter of the 16th century.



Swords imbedded in concrecions



Chest of sword blades



Copper Ingots



Copper ingots formed the main cargo of the Bom Jesus. A total of 1845 were recovered weighing between 8 and 20 kilograms each, adding up to a total of about 20 tons. They were considered to be a strategic material in India, where they were combined with tin to make bronze, which was then used for casting cannons. Many of them were stamped with a trident symbol inside a ring. This was the hallmark of the Fugger Company, a family business which supplied the copper concerned from its mines in Hungary, and was probably intended for the purchase of pepper from India.

The sheer amount of Fugger copper that was on board raised the possibility of Fugger complicity in the financing of the voyage concerned. The Fuggers, after all, played an extensive role in both the finance and the politics of the time. This is demonstrated by the fact that the Fuggers not only minted the money that was used by the Papal State, but also discretely put their trident-and-dot hallmark on the papal coins that they supplied on credit.

It follows that the Fugger-supplied copper may have been more than merely a cargo. It may, in fact, be hard evidence of the substantial role that Fuggers played in facilitating and even controlling the trade to India.



Rolls of lead sheeting (top) and Lead ingot (bottom)





Tin ingots



Lead and Tin Ingots

In addition to the three rolls of lead sheeting – which was presumably for hull repairs, there was also some crumpled lead sheeting and literally hundreds of narrow lead caulking strips - some flat with nail holes through them, some twisted or rolled into tubes. The latter would have been forced into the spaces between outer hull planks with pitch and string, whereas the former would have been nailed down along the outside of the joints between the hull planks to keep the other strips in place.

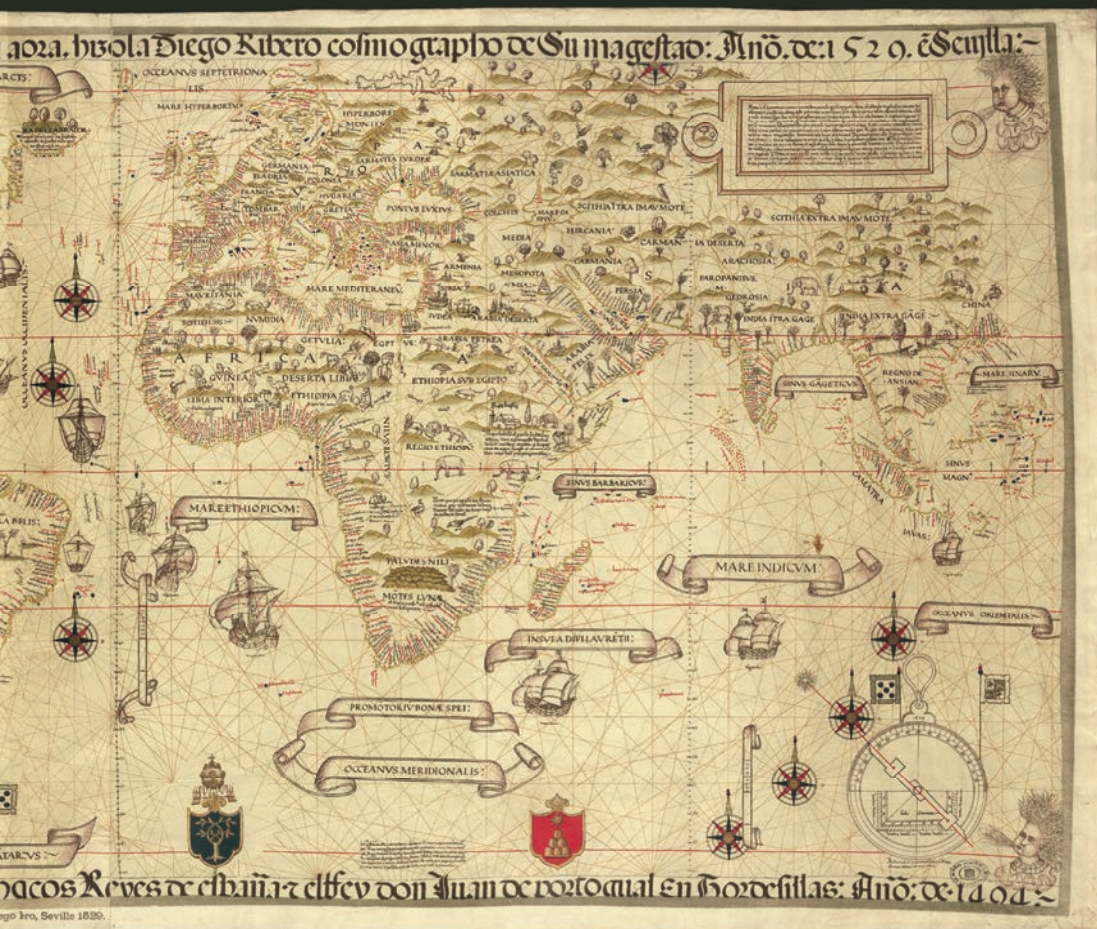
Also forming a large part of the cargo and providing ballast for the ship were many lead ingots. Lead being a byproduct of silver mines which were situated in Joachimsthal in Bohemia, now part of Czechoslovakia. It was refined in Chemnitz, just across the border in Germany, by an H. Walther, who was working for the Nuernberg ranch of the Welser family, which also had a branch in Augsburg, the main distribution center of the Welser family. The symbol stamped on the ingots is a “W”, as used at that time by the Nuernberg branch of the Welser family.

The Fuggers and the Welsers at that time had a complete monopoly of all the lead mined in Europe and basically dictated the prices. This ingot, with that stamp, perfectly symbolises that monopoly.

Each tin ingot is about the length of a ruler. There were several hundred of these tin bars on board weighing close to 3.5 tons, on their way to India to be combined with copper to make bronze for cannons.



The layout of this map was informed and influenced by information obtained during the Magellan-Elcano circumnavigation of the globe. At the time that Ribeiro created this map, European explorers had not yet travelled to the west coast of the Americas, or to Australia or Antarctica. The extent of the Pacific Ocean was represented here for the first time although the size of the Indian Sub-continent appears too small. Although the coastline of Africa had been explored by European traders, the interior of Africa would not be mapped until the 19th century.





Ivory

Elephant tusks had been found washed up along the coast near the mine for many years, and were a subject of much debate as it was thought that they were either contraband thrown off vessels or that they had washed down the river. In fact, they were valuable cargo of the Bom Jesus and had been carried as deck cargo and hence had spread further than the other goods.

Another cause of the widespread tusks was due to the fact that the top of the site had been bulldozed before excavation, as well as the fact that mining had taken place all around it. As a result, a substantial number of “loose finds” were recorded. The most ubiquitous of these were the elephant tusks, most of which were found off-site. Once the fact that they were part of the wreck became known, they were brought to the site as and when they were found. In the end the grand total for elephant tusks recovered was 67 tusks and 40 broken chips and small pieces, with a total weight of 628,7 kg.

An investigation into the origin of the tusks was conducted by a team of experts from South Africa, Namibia, the USA and England. Team members visited Oranjemund and were able to extract samples of ivory from the tusks. By analysing the paleogenomic and stable isotopes, and looking at the



Nuclear DNA they were able to identify the tusks as belonging to African forest elephants (as opposed to savanna elephants). Mitochondrial sequences traced them to West, not Central Africa and specifically to 17 specific herds. During the time of the Bom Jesus ivory was a valuable trading item which linked Africa, Asia and Europe.



Coins

The excitement of finding gold treasure on an ancient shipwreck cannot be overestimated. On the 17th of April during the first excavation Hermann Josef found the first silver coin, followed by Willem Kuyonana finding another one, and then half an hour later Titus Shekonko found the first gold coin.

Whereas the gold coins all came from the same area on the site, the silver coins were more widely distributed, with some coming from the same areas the gold and others coming from the southern margin of the site.

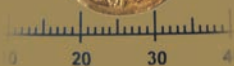
Some 2256 Gold coins weighing a total of 21.15 kg were recovered during the first excavation. Some 174 of these were Portuguese. The majority of the balance were Spanish "Excellentes" depicting Ferdinand and Isabella of Spain on





the one side and the Spanish coat of arms on the other. A total of 97 silver coins – all Portuguese – with a weight of 1.15 kg were also recovered.

The Portuguese coins have been identified as 10 Cruzados gold “Portugueses”, minted from 1525 to 1538 by King Joao III of Portugal. They were apparently the preferred means of payment for Indian Pepper. These coins are extremely rare because they were recalled by the king in 1538 due to too high a gold content, and melted down without being re-issued.



The rest of the gold coins are largely Spanish “Excellentes”. The royal couple depicted on them were King Ferdinand and Queen Isabella of Spain, who ruled from 1481 to 1504. About half a dozen other coins (eg. Venetian) made up the total. 1.6 kg of the gold coins were stuck together in concretions, making them difficult to count – hence the need to estimate.

The overall impression created by the condition of the gold coins was that the Spanish coins had been circulated, whereas the Portuguese coins were in mint condition when they were put aboard the ship. This scenario is supported by the fact that the Spanish coins came from more than one mint (e.g. both from Barcelona and Seville), as a result of which they would have been minted at different times and at different places.

The Portuguese coins, on the other hand, not only came from the same mint. They had literally been struck with the same set of three dies. This means that they were part of the same “run”, a result of which they would have been struck at the same place and at the same time.

The shape of the concreted Portuguese coins as well as of loose Portuguese coins that were excavated together, demonstrated the tremendous pressure the coins were put under either during or subsequent to the shipwreck. This lent credence to the suggestion that the chest full of coins was pinned down

“Excellentes”



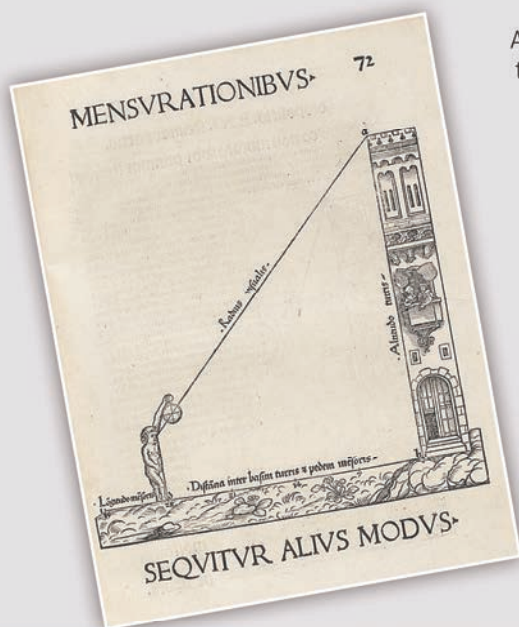
Navigation Tools

The navigational instruments recovered, being made up of three astrolabes, three navigational dividers and part of a set of compass gimbals, is quite impressive. While two of the astrolabes were very badly corroded, the third one was so intact that the degrees depicted on it could still be read. The two corroded astrolabes are made from gun metal, while the third is bronze.

Astrolabes are navigational instruments that allow the user to calculate astronomical positions precisely and will determine exact latitude. In other words they allow you to calculate how far north or south you are through triangulation, but not how far east or west.

All three astrolabes appear to be from the same maker, in addition to which their style suggests that they were from before 1550. Because the oldest maritime astrolabe that has been reliably dated so far is from 1540, it follows that the astrolabes found with the Bom Jesus could be the three oldest maritime astrolabes in the world.

The question of why there were three astrolabes on board the Bom Jesus could be explained by the fact that different astrolabes are used for the northern and southern hemisphere.



Astrolabes



Degrees engraved on scale





Lead sounding weights

Three sounding leads were found at a distance from the excavation site. This indicates that these instruments might have been in use at the time of the wrecking. Incredibly traces of beeswax were found on the bottom of the sounding lead. This has a practical purpose: you throw the lead overboard attached to a long rope, when you pull it up you know whether you are on rocks or sand, because of what is sticking to the wax!



Charting divider





Copper frying pans
Porringer bowl



Pewter plates



Tankard with lid

Life on Board

The considerable number of pewter plates, bowls, tankards and mugs found during the excavation easily constitute half a dinner service. The appearance of the items suggests they all come from the same source, and show signs of use, although they could also have been trade goods.

Other items of kitchenware include a pestle and mortar, a perfectly preserved set of weighing cups, knife handles and other utensils. Ships like the Bom Jesus did not have kitchens or galleys so cooking would have taken place on the deck on an open fire. Two large cauldrons were recovered which would have been used on the fire.

The two-tine fork appears silver but is most probably made of brass, the silver colour having been the result of the fork lying in a pool of mercury (of which there were some two tons on board) at the bottom of the sea for 500 years. The design is typical of most forks which were used in the medieval period and during the early Renaissance. Interestingly, some of the gold coins were also coloured silver by the mercury.

The large amount of what appears to be the handles of cutlery, as well as the fact that many were packed extremely close together, suggests that they may have been trade goods.



Weighing cups

Two-tine fork



Nit combs

A syringe was recovered which would have been part of the ship's doctor's equipment, and has been identified as an instrument for injecting mercury into the urethra as a treatment for syphilis. Coral was found, which would have been ground fine for medicinal purposes. Other personal tools found which were for the use of the sailors are the nit combs, razors and rosary beads.

Decorative hinges could have been part of the chest containing gold and silver coins, as well as for binding of books, and the buckles could have been

Syringe



Mercury

Buckles



part of the sailors clothing, fastening shoes or belts. Thimbles would have been used in repairing the sails.

With the exception of a string of rosary beads, a shoe, a copper bangle and the fine copper chain-mail, few personal items were found. This is rather surprising, considering that well over one hundred people may have been on board.

Hinges



Thimbles



Rosary beads



Artefact Storage

The artefacts were originally stored in a large shed, located within Mining Area 1 at the Waste Management site. The only exceptions were the coins, the rosary and the astrolabes, which were all at first stored in the safe at the geological laboratory. Eventually, however, the coins were transferred to the Bank of Namibia for safe keeping.

An alternate space was found for all the artefacts in a warehouse in Uubvley within the mine where they are still housed.

The 2156 gold coins are stored in individual plastic bags and are now in a vault at the Bank of Namibia.

The 1845 copper ingots – weighing an estimated 20 tons – are stored dry on wooden shelves, as are the eight cannons. All other brass, copper and bronze are stored wet. The tin and lead ingots are stored dry while the ivory is wrapped in plastic cling film.

The five anchors and all the wooden remains of the hull are all stored in large tanks of water while all stone cannon balls are able to be stored dry.





The Bom Jesus





Those who were involved...



*Kaapanda
Shatika*



*Bob Burrell
(Chief Geologist)*



*Inge Zaamwani-
Kamwi (CEO)*



*Dr Jürgen Jacob
(COO)*



*Dr Dieter Noli &
Gully Muteka*



*Herman Josef
(First silver coin)*



*Titus Shekonko
(Found the first gold
coin)*



*Willem Winkler
(Found an astrolabe)*



*Herman Nortje
(Found a chart
divider)*



Excavation team



*Ministerial delegation & international
researchers*



Survey team



Ministerial delegation & OMDiS team

Discovery & Excavation team

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University of Namibia (student internship programme)

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Ministry of Education, Arts and Culture (MoEAC, now housing Culture)

Sanet Steenkamp, Gerard Vries, Gqwede Mzingisi, Manfred Gaeb, Eino Ngesheya, Lukas Moongela, Johanna Ndahekeleleka Ndjamba, Goodman Gwasira

Namdeb Management, Environmental, Survey and Geolab teams

Inge Zaamwani-Kamwi, Chris Sivertson, Mitford Mundell, Dr Jürgen Jacob, Pete Shout, Ronel van der Merwe, Ursula Witbooi, Nande Nickanor, Tony Goosen, Johnny Mall, Alcides Chipeio, Hilma Mbangula, Theo Feris, Elana Groenewald, Mona van Rooi and Latiefa Uunona

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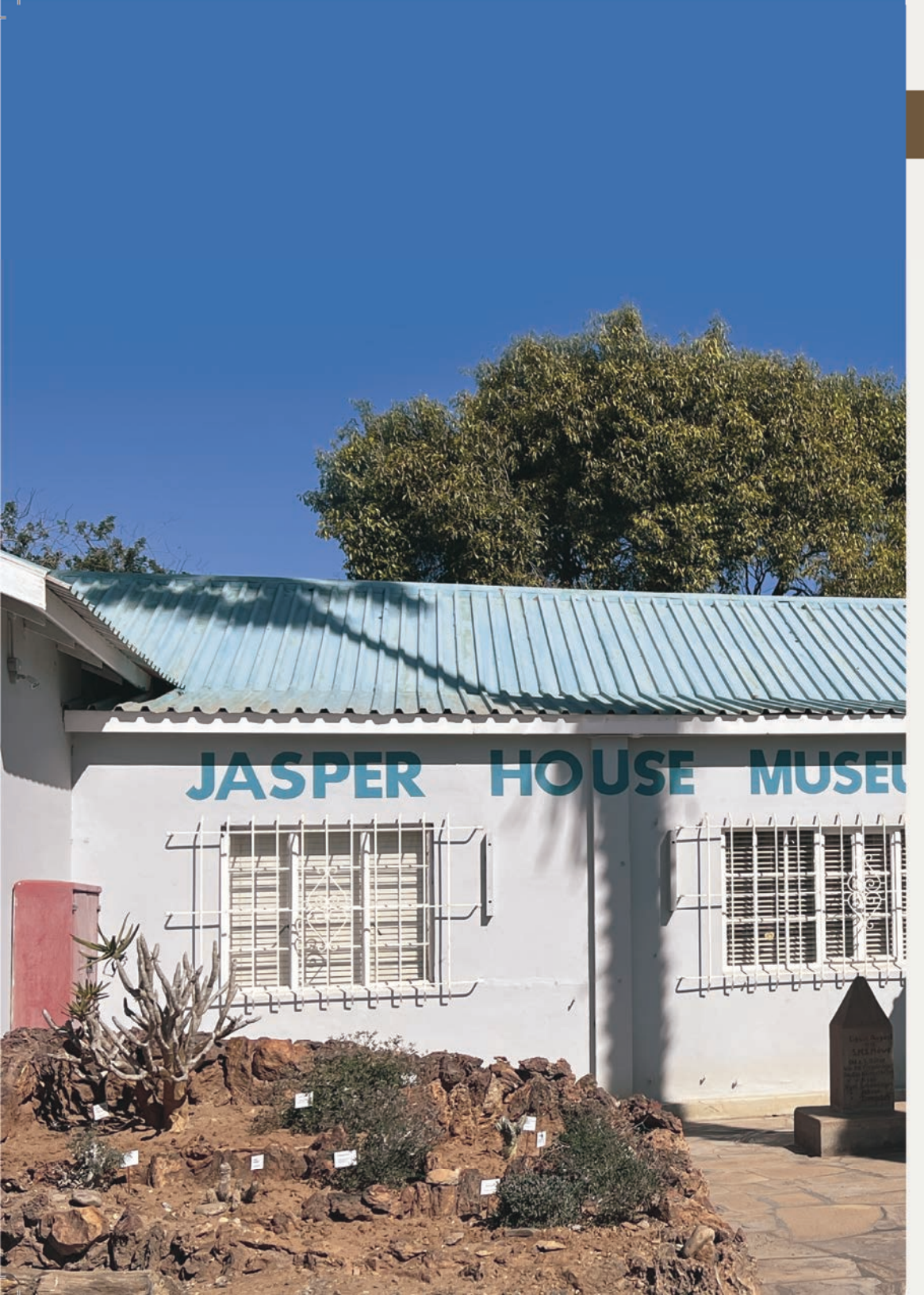
Tony Bessinger, Ronel van der Merwe, Aunie Gideon, Nicky Marais, Selma Stephanus, Linda de Wit, Mia Nel, Chanel van Wyk

StArt Gallery

Helen Harris (display and primary research)

Other helpful individuals associated with this exhibit

Jan Sutherland, Jack Wasserfall, Elmarie Snyman, Andy Garrison, Garaldine Kavari, Mark Bock, Ndeshipanda Nghipandulwa, Karel du Toit, Dr Jana Jacob, Marlene Maritz, Stephan Grobbelaar, Mia Nel, Namdeb Transport (GT Max and team), Gerhard Engelbrecht



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Acknowledgements

We wish to acknowledge **Namdeb Diamond Corporation** for the significant role it played in discovering the shipwreck and enabling its excavation by availing its people and equipment. For their contribution, Namdeb was awarded the African World Heritage Excellence Award in 2015 for their role in heritage conservation.

Photo sources:

Dr Dieter Noli, Ashley Coutu, Ronel van der Merwe, Dr Francisco Alves, Dr Bruno Werz, Andre Pretorius, National Museum of Namibia, National Heritage Council, Namdeb

Mural artists:

Aurelia Sieberhagen, Wilma van Tonder, Immanuel Chiete

Text:

Based mainly on excavation reports by Dr Dieter Noli and other scientific papers

Edited: Nicky Marais

Designed: Silke Kotze

Printed:

John Meinert Printers

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