R.M.S. *TITANIC* – SCIENTIFIC EXPLORATION AND RESEARCH

The 883-foot Royal Mail Ship (R.M.S.) Titanic was thought to be unsinkable on its first Atlantic crossing from Southampton, England to New York City when it struck an iceberg and sank in the early morning hours of April 15, 1912. 1,517 people lost their lives in the icy North Atlantic including the ship's captain, 832 passengers and 684 crew members. Some of the 706 survivors describe the Titanic breaking in half while sinking explaining why explorers found the forward and aft sections of the ship separated by almost half a kilometer. The forward section shown here is nearly intact, while the aft section was badly damaged by implosions as the ship sank. With support from NOAA's Office of Ocean Exploration and Research, marine archaeologists and other scientists are now using new technology to research and manage the site. Tools such as remotely-operated vehicles and human-occupied submersibles extend our capability to work in the deep ocean on shipwrecks such as R.M.S. *Titanic* nearly two and a half miles below the surface. NOAA expeditions to *Titanic* in 2003 and 2004 revealed new insights on the processes causing the ship to slowly degrade. One of these processes is caused by microorganisms that consume the iron contained in the steel hull. "Rusticles", rust colored formations that look like rusty icicles are the result. Research on the effects of iron-consuming bacteria found on *Titanic* can now be applied to better understand deterioration of deepwater steel-hulled shipwrecks all over the world. NOAA has a continuing interest in the protection and preservation of *Titanic* and under the authority of the R.M.S. Titanic Maritime Act of 1986, issued Guidelines for the Research, Exploration and Salvage of R.M.S. Titanic in 2001.

The bow of R.M.S. *Titanic* encrusted with rusticles.[2]

Windlasses and massive anchor chains on the forecastle deck.[2]

Rusticle formations on the hull and anchor.[2]

This large capstan used for handling lines is located on the starboard side of the forecastle deck. Memorial plaques can be seen on some capstans. These capstans serviced lines for the paired bitts along the rail.[1]

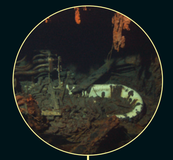
Titanic's foremast , now fallen across the deck, is hollow for a watch stander to climb a ladder inside to the crow's nest and is where lookout Frederick Fleet rang a bell and called out "Iceberg, right ahead". Mr. Fleet survived the disaster as a crewmember of Life Boat #6. [2]

Two electric cranes for handling cargo are located on the well deck.

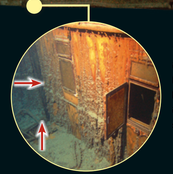
An empty lifeboat davit hangs over the deck with the pulley block still attached. There were 2,224 passengers and crew on the ship but the 20 lifeboats only had room enough for 1,178.[2]

The bronze telemotor once held the ship's wooden wheel that has been consumed by marine organisms. In the foreground memorial plaques placed by visitors pay tribute to those who lost their lives.[2]

A large opening marks the location of where the forward stack once stood, one of four stacks. Only three served as smoke stacks for the boilers. The fourth stack was largely for appearance and to ventilate some areas of the ship's interior.



The bathtub in Captain Smith's bathroom. Rusticles are growing over most of the pipes and fixtures in the room.[2]



The forward expansion joint crossing the boat deck is shown by arrows. Expansion joints built into the ship's hull helped alleviate shear stress, or twisting motions, caused by rough seas.[2]

This skylight opens on the Marconi radio room where operators Jack Phillips and Harold Bride sent out distress messages reporting that the *Titanic* was sinking and in need of assistance. While Phillips perished, Bride survived the sinking.

This opening is the collapsed roof of the Grand Staircase.

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TITANIC EXPLORERS AND THEIR TOOLS

Today's ocean explorers have a wide range of education backgrounds and experiences that reflect the complex nature of working in the deep sea. Ocean Explorers include scientists, engineers, technicians, ship captains, submersible and remotely-operated vehicle pilots, teachers and many others. Go to OceanAGE Careers to learn more about these careers, *http://oceanexplorer.noaa.gov/edu/oceanage/welcome.html*. To learn more about exploring the ocean and the *Titanic* expeditions go to *http://oceanexplorer.noaa.gov/*.

Scientists inside the MIR 1 submersible, are launched over the side of the Russian research ship *Keldysh* for a 2-hour, 12,467 foot descent to the *Titanic*.[1]

The Hercules, a remotely-operated vehicle or ROV, used to explore and image the *Titanic* in 2004, is operated by a pilot on the NOAA Ship *Ronald H. Brown*.[2]

ABOUT THE PHOTO MOSAIC

Images that make up this mosaic of the R.M.S. *Titanic*'s forward section were taken by the HERCULES ROV during a 2004 expedition led by Dr. Robert D. Ballard, who discovered wreckage of the shipwreck in 1985. The main supporters for this exploration technology are the Office of Naval Research (ONR) and private sponsors. Copyright: Institute for Exploration, Mosaic created by Hanumant Singh, WHOI.

Image Credits:

[1] *Credit: NOAA and the Russian Academy of Sciences*

[2] *Credit*: NOAA / Institute for Exploration/University of Rhode Island