

TITANICA

Teacher's Resource Guide to the IMAX® Large Format Film



Imax Corporation



Dear Educator:

The *Titanic* has fascinated the world for more than eighty years. Once considered to be the pinnacle of human technological achievement, the *Titanic* has come to represent the greatest marine disaster of all time. For decades she lay at the bottom of the icy Atlantic, out of human reach. Now, recent advances in submersible technology have made it possible to visit the legendary shipwreck and, perhaps solve some of its mysteries.

In 1991 Imax Corporation organized the third manned expedition to the *Titanic*, following on two previous expeditions in 1986 and 1987. The IMAX/Titanic '91 Expedition was the first to include scientists to engage in scientific research around the shipwreck.

This Teacher's Resource Guide has been developed as an educational supplement to the large-format film *Titanica*. The materials are designed for use with junior and senior school students. The activity ideas and discussion questions incorporate the sciences, social studies, history, language and creative arts. We encourage you to modify the materials to suit your individual curricular needs and hope you will find them helpful.

We hope this guide and the film *Titanica*, along with the companion book **Titanic...In A New Light** will give your students an exciting new perspective on the world's most famous shipwreck.

Best wishes,

Sussan Mander
Imax Corporation, Film Distribution

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Study Guide

All photographic images in this resource guide appear
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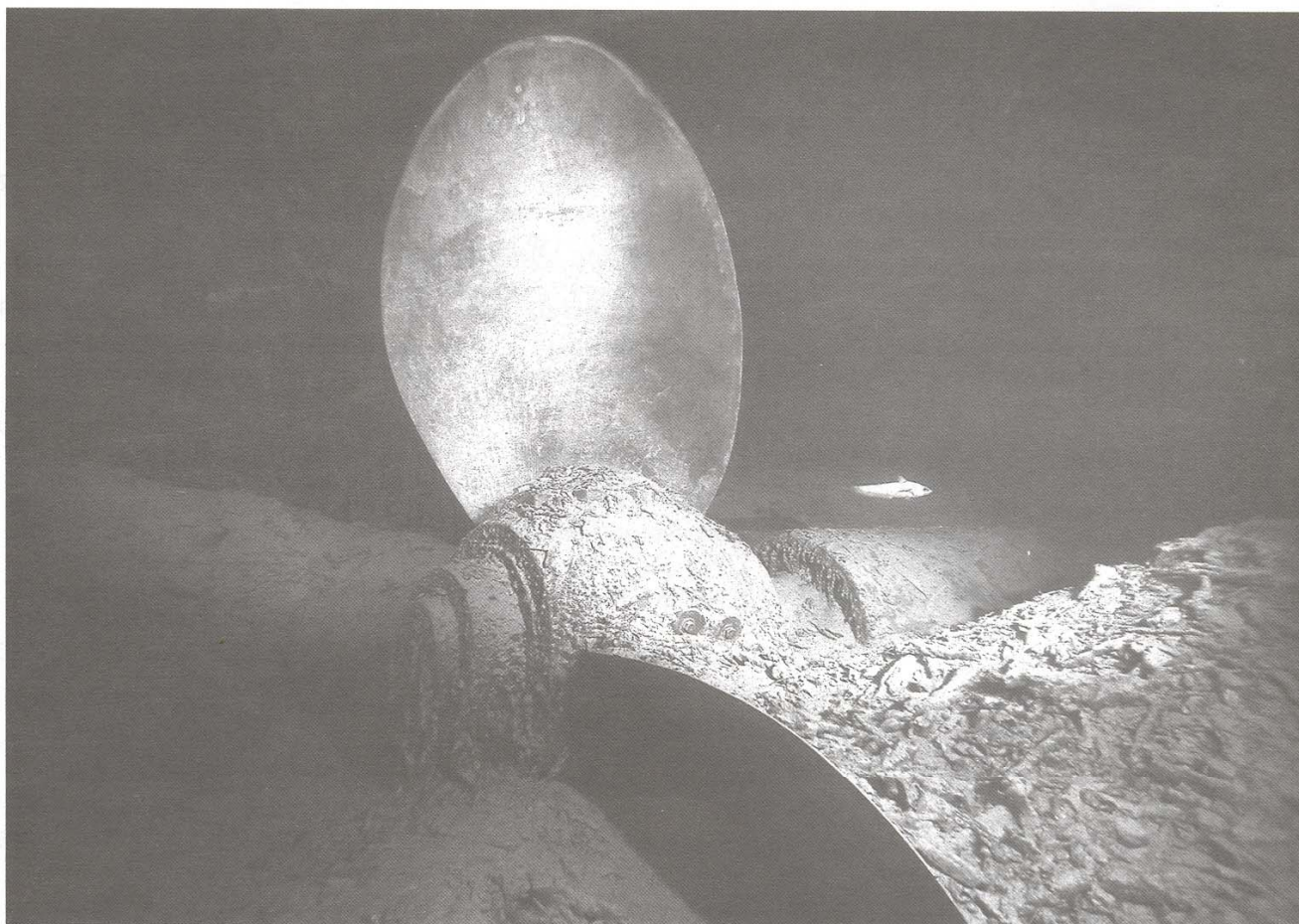
Cover Photo: The bow of the Titanic.

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SYNOPSIS OF THE FILM



The starboard propeller.

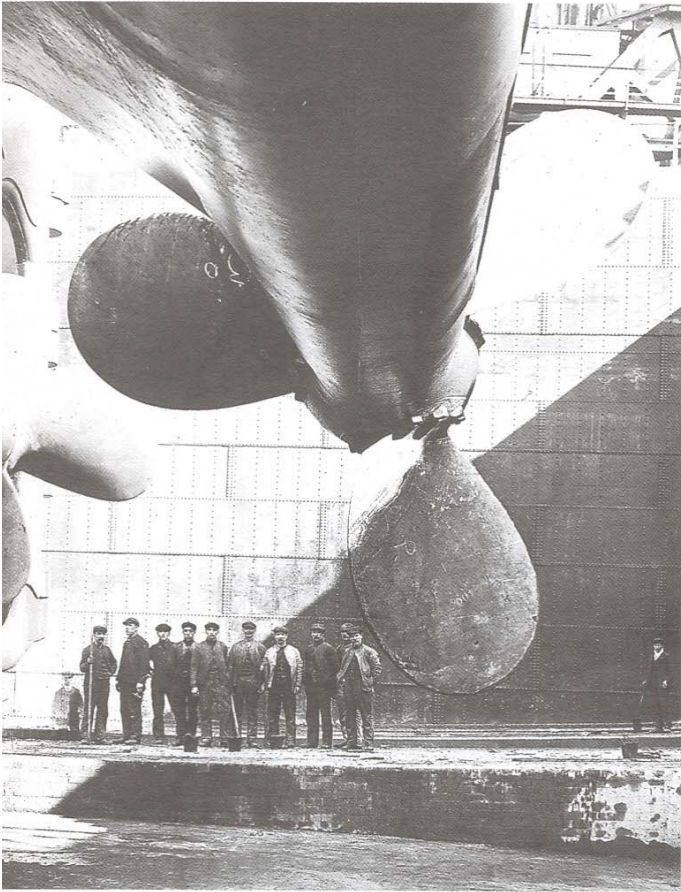
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In the summer of 1991, a major scientific expedition was launched to the wreck of the *R.M.S. Titanic*. This mission represented an international collaboration of Canadian, American and Russian scientists, institutions and personnel. Operating from the world's largest research vessel, the *Akademik Keldysh*, and using twin Russian submersibles, *Mir I* and *Mir II*, the expedition conducted 17 dives to study this legendary wreck and its relationship to its deep ocean environment. Filmed in giant-screen format from the submersibles using deep-sea lighting specially developed for the mission, the team recorded extraordinary images of the wreck, its debris field, and of the expedition itself.

In the eerie darkness, 2.5 miles (4 km.)

below the surface of the North Atlantic, we encounter the bent, rust-encrusted remains of the *Titanic*. On the giant movie screen, images of the once-luxurious liner are nearly life size. Twisted metal, broken fittings and scattered personal belongings litter the site. Here, too, we see the *Titanic's* new passengers—sponges, corals, starfish, crabs and rattail fish.

A feature-length film, *Titanica* draws us through several stories. In photographs from the original glass-plate negatives, we witness the creation of the world's largest and most luxurious ship in the Belfast shipyard. We re-live that tragic April night in 1912 when the *Titanic* collides with an iceberg as survivor Eva Hart recounts her personal recollections as a 7 year-old. We



Shroud workers line up under the massive propeller.
PHOTO CREDIT: Ulster Folk and Transport Museum

also experience the high-risk underwater mission of an international expedition team.

Titanica is more than a documentary film about a maritime disaster. It is a vivid drama about real people and real situations. As we are introduced to the six principal members of the international team, we learn each member has his own obsession with the *Titanic* and agenda for the mission. The Russian members include the expedition leader and marine engineer Anatoly Sagalevitch, marine biologist Lev Moskalev, and submersible pilot Evgeny Chernjaev. The Americans are *National Geographic* photographer Emory Kristof and cameraman Ralph White, a *Titanic* expert. The scientific leader is Canadian marine geologist Steve Blasco.

In *Titanica*, we experience the adventure, drama and danger of deep sea exploration. As we marvel at the technology which has enabled us to explore and film this famous wreck, we are solemnly reminded that the “unsinkable” *Titanic* was the technological achievement of her era.

The 1991 IMAX/*Titanic* Expedition is a partnership of Imax Corporation, the P.P. Shirshov Institute of Oceanography (Russian Academy of Science), Undersea Research Ltd., and Low Films International, Inc.

The following suggestions for activities and discussion topics will heighten student interest in the film and their awareness of concepts that will be reinforced in later units.

Pre-screening Discussion and Activity Ideas.

Have the students discuss what they know about the *Titanic*. What books have they read or television programs have they viewed on the subject?

Divide the class into small groups and have each group research a different aspect of the *Titanic*. Compile a composite report of facts and information about the ship, including the discovery of the wreckage site in 1985.

Using a map of the North Atlantic Ocean, point out key locations relevant to the *Titanic*: Belfast, Northern Ireland (where the *Titanic* was built); Southampton, England (port of embarkation); and New York (destination). Locate the wreckage site at: Latitude 41° 43'N, Longitude 49° 57'W. How close was the *Titanic* to completing her maiden voyage?

Although the *Titanic* sank in 1912, the liner continues to be a source of legend and historical curiosity. The maritime disaster has spawned scores of books, films, songs, a play and even an opera. Have the students discuss why they think the *Titanic* continues to capture our attention and imagination.

TITANIC: FACTS IN BRIEF

History

The *R.M.S. Titanic* and her sister ships the *Olympic* and *Britannic*, were built by the White Star Line to dominate the trans-Atlantic passenger trade. At the beginning of the 20th century, the major shipping lines foresaw financial problems. Emigrant traffic from Europe to North America, once their greatest source of revenue in the late 1800's, was beginning to decline. Passenger trade was now being taken up by the *nouveau riche* (mostly Americans) traveling abroad for business and pleasure. These passengers demanded increased luxury as well as safety and speed. Offering both speed and comfort, the new German shipping lines presented growing competition. Thus, the *Titanic* would have to attract all classes of passengers to successfully compete with other ships.

Description of the Liner

At the time of her launching in 1911, the *Titanic's* builders, Harland and Wolff shipyard, described her as the biggest, most luxurious and most secure vessel afloat. Nine steel decks made her as tall as an 11 story building. As long as two city blocks in length (882 feet/269 metres) and 92 feet (28 metres) wide and weighing over 46,000 tons (42,000 metric tonnes), the *Titanic* was then the largest moving object ever built. Everything about the liner was big and technically advanced for the times.

- To ensure safety, the *Titanic* was built with a double bottom. The hull was divided into 16 watertight compartments with 15 transverse steel bulkheads.
- The three anchors weighed a combined 31 tons (28 metric tonnes). Each link in the anchor weighed 175 lbs. (80 kilograms). The rudder weighed 101 tons (90 metric tonnes) and was as big as a house.
- The four funnels measured 62 feet (20 metres) in height and 22 feet (6.7 metres) in diameter.
- The *Titanic's* power plant of 29 boilers and 159 furnaces (that consumed 650 tons of

coal each day) produced a combined force of 50,000 horsepower.

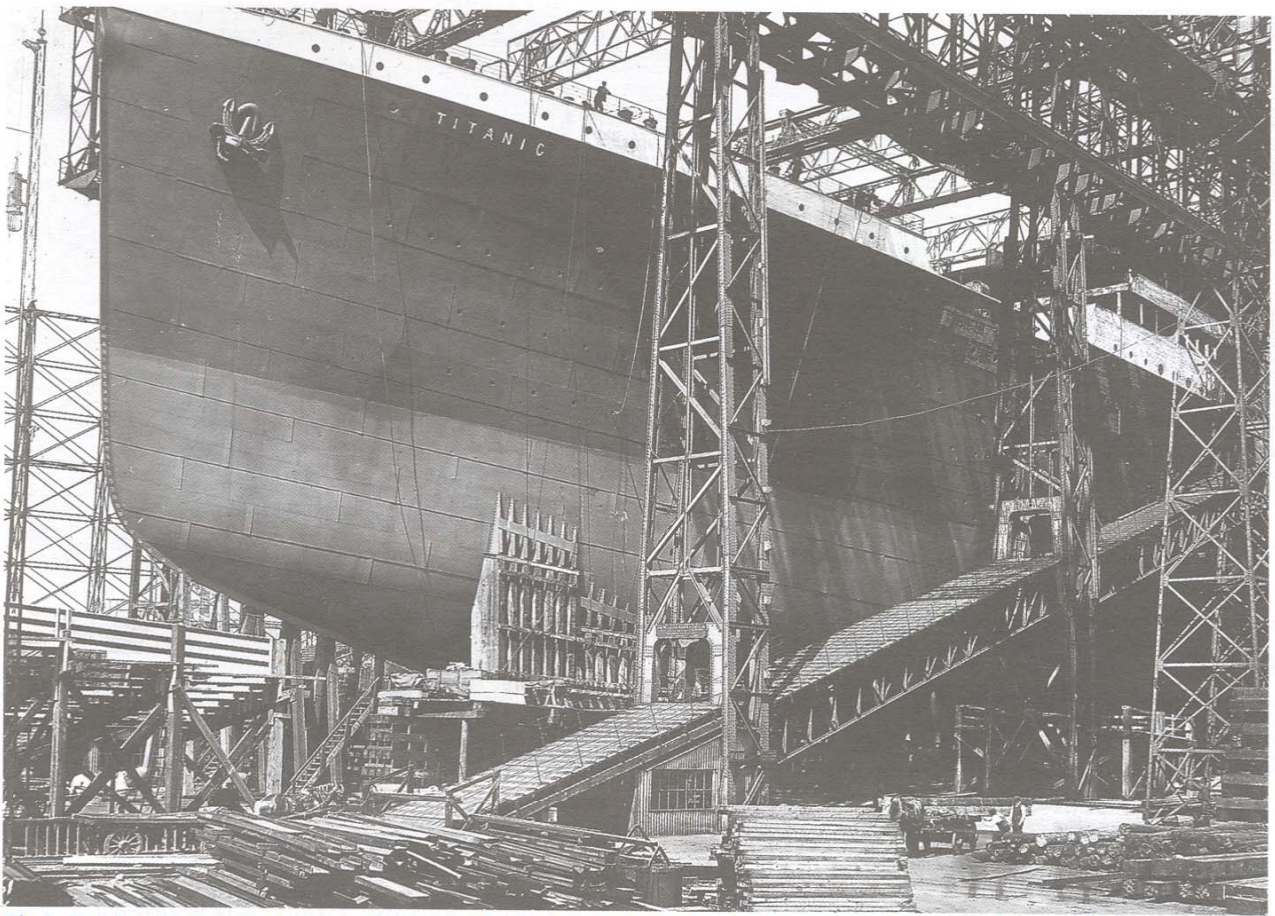
- Driven by three manganese-bronze screw propellers, the *Titanic* could cruise up to 23 knots under full power. The two wing props each measured 23.5 feet (7.2 metres) in diameter.
- The *Titanic* was certified to accommodate 2500 passengers and a crew of 940.

Amenities

- Described at the time as a "floating hotel", the *Titanic* was designed for ocean-going luxury and comfort. The cost to build and outfit her was estimated at \$7.5 million US (£ 1.5 million) in 1912, or \$100 million US in today's money.
- The first class staterooms, lounge, dining room and smoking room were the most palatial passenger accommodations of any liner ever built. Suites were furnished in various period designs. Although not as luxurious, the second and third class accommodations exhibited a degree of comfort rarely achieved in previous ships.
- The *Titanic's* modern conveniences included:
 - 4 elevators and a 50 line telephone exchange
 - Individual heating units in first class staterooms
 - Gymnasium with the latest electric exercise equipment
 - Swimming pool
 - Refrigeration plant
 - Fully equipped hospital and surgery, barber shop, and darkroom
 - Fully electric kitchens with food preparation gadgets unknown in ordinary homes

Titanic Trivia

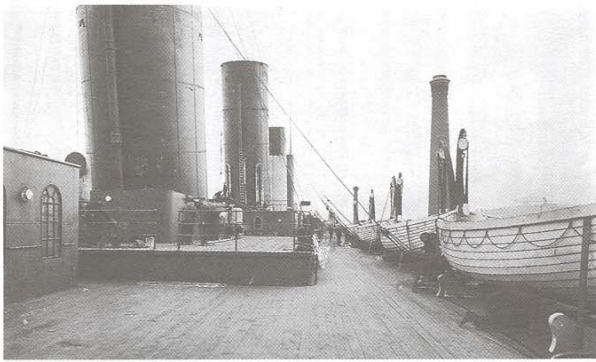
- "R.M.S." stood for "Royal Mail Steamer". The *Titanic* carried mail for the British Post Office.
- The *Titanic's* builders and owners never described her as "unsinkable". That



The hull of the *Titanic* can be seen in dry dock as workers approach completion. PHOTO CREDIT: Ulster Folk and Transport Museum

distinction was given to the liner by the press prior to the voyage.

- On her maiden voyage, the *Titanic*, carried a little over one-half of her total passenger capacity (337 First Class, 271 Second Class, and 721 Third Class). She carried 900 tons of marine baggage and first class freight plus 3465 bags of mail.
- The White Star Line, owner of the *Titanic*, was actually controlled by an American holding company, the International Mercantile Marine, formed by millionaire J. P. Morgan and several other American investors in 1902.
- Although she reportedly was carrying a priceless jewelled copy of the *Rubaiyat of Omar Khayyam*, the *Titanic*, was not the "treasure ship" of legend. Her manifest revealed mundane and ordinary cargo worth (\$420,000 US (£ 84,000) in 1912.
- The most unusual cargo was 76 cases of "dragon's blood", probably used in the manufacture of varnishes and lacquers.
- The *Titanic* carried several noted American millionaires, prominent British, Canadian and U.S. businessmen and political figures. They included Col. and Mrs. John Jacob Astor; Benjamin Guggenheim (mining tycoon); Charles M. Hays, (President, Canadian Pacific Railway); Mr. and Mrs. Isador Straus (Macy's retailing magnate); J. B. Thayer (President, Pennsylvania Railroad), Major Archibald Butt (Military aide to President Taft); and Margaret J. Brown (Denver socialite, immortalized later as "The Unsinkable Molly Brown"). It was reported that the combined personal fortunes of the *Titanic's* elite passengers was worth \$600 million US (£ 120



Titanic's lifeboats were similar to these from the Olympic.
Photo Credit: Ulster Folk and Transport Museum

million) in 1912.

- Also making the maiden voyage were Bruce Ismay, Chairman of White Star Line, and Thomas Andrews, a managing director of Harland and Wolff shipyard, the *Titanic's* builder.

The *Titanic* Lost

- Four days out on her maiden voyage, bound for New York, the *Titanic* struck an iceberg at 11:40 PM, 14 April 1912. Only 2 hours and 40 minutes had elapsed when she sank at 2:20 AM on 15 April.
- Of the 2224 passengers and crew aboard the liner, only 711 survived. 1513 people perished.
- Although she was originally designed to carry 42 lifeboats, the *Titanic's* 20 lifeboats (including four "collapsibles") could accommodate only 1178 people. Ironically this latter number of lifeboats exceeded the outdated British Board of Trade regulations by more than 10% capacity.

The *Titanic* Found

- In 1985, the *Titanic* wreckage was located approximately 375 miles (625 km) southeast of St. John's, Newfoundland and 1000 miles (1609 km) due east of Boston, Massachusetts by a French-American expedition led by Dr. Robert Ballard from Woods Hole Oceanographic Institute. The site was approximately 13.5 miles (21.6 km) southeast of the last position given in the *Titanic's* distress

messages.

- The ship split into two sections at or near the surface and sank in 12,500 feet (3,800 metres) of water.
- The bow and the stern sections came to rest approximately 1970 feet (600 metres) apart. Wreckage, debris and personal effects were scattered over a 1/2 mile (.8 km) area.

The following activities are intended to provide a selection of ideas for various age levels. Please adapt the activities to your specific needs.

Activity Ideas

Invite a student or adult who has traveled on an ocean or cruise liner to describe his or her experience to the class. What were the accommodations like? What comforts, amenities and activities were provided for the passengers? What safety measures were taken aboard ship?

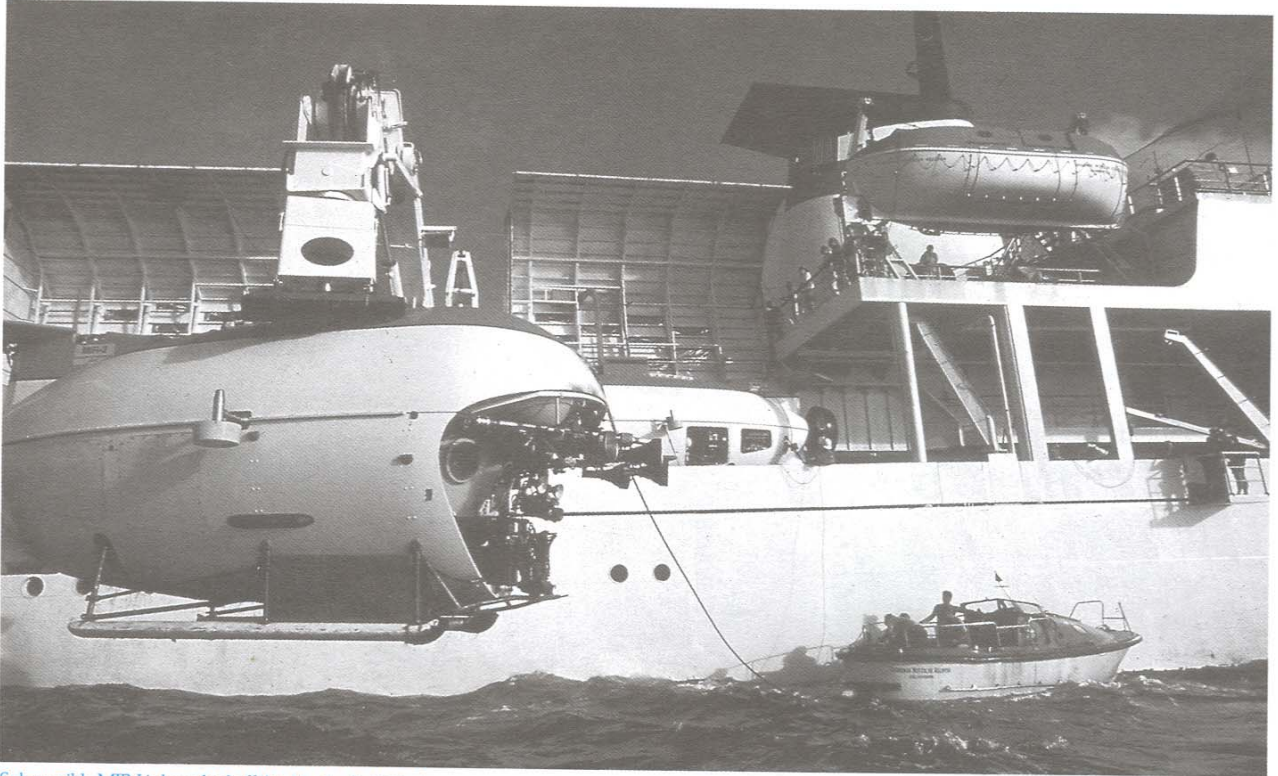
Compare the *Titanic* in size, speed and accommodations to later ocean liners such as the *S.S. United States*, *Queen Mary*, and *Queen Elizabeth 1* and 2.

No sooner had the *Titanic* sunk when enterprising individuals proposed various methods to recover the liner. Recovery was contingent on pinpointing the wreckage site. Investigate the schemes and expeditions to locate and recover the *Titanic* prior to 1985. (See "Searching for the *Titanic* Gold", *Smithsonian*, August 1986.) Were any of these schemes feasible? How has technology advanced through the decades to help locate and explore the wreck?

Discussion Questions

Discuss the significance of ocean-going vessels as the only type of trans-Atlantic transportation in the early 20th century. When was the airplane invented? When did airplanes first begin commercial trans-Atlantic flights? What has happened to trans-Atlantic passenger ship traffic since that time? Why do you think this happened?

THE TECHNOLOGY



Submersible MIR I is launched off the *Akademik Keldysh*.
Photo Credit: Terry Thompson

Investigating and filming the *Titanic* at 2.5 miles (4 km) down was not feasible a number of years ago. Recent advancements in computer sciences, communications, submersibles and other technologies have enabled scientists to study the ocean's geologic features, to search its floor for new life forms and natural resources and to explore its once-inaccessible depths.

The *Akademik Keldysh*, the flagship of the P.P. Shirshov Institute of Oceanology in Moscow, served as the base of operation for the IMAX Expedition. The world's largest research vessel (400 feet/124 meters), the *Keldysh* has been used primarily for oceanographic research. It has 18 laboratories, accommodates 130 people, and is the mothership of the *Mir I* and *Mir II* submersibles.

Twenty-three and a half feet (7.8 metres) in length and weighing 20 tons (18,600 kg) each, *Mir I* and *Mir II* are the world's most advanced deep sea submersibles. Made of a

special alloy steel, they can dive to depths of 20,000 feet (6,000 metres) and withstand pressures of 9000 pounds per square inch. Thus, the manned *Mir* submersibles are capable of surveying 95% of the ocean floor.

Each submersible carries a crew of three who are confined to a cabin area 6.5 feet (2 metres) high and 5 feet (1.5 metres) wide. This tiny cramped sphere with its sophisticated instruments, IMAX filming equipment and life support systems was "home" to the crew during their 18-hour dives and 2.5 hour descents to the *Titanic*.

Each submersible is outfitted with sensors to measure water temperature, salinity, depth, sound velocity and currents. Robotic arms can collect objects or take samples. For the filming, a 100 pound (45 kg) IMAX camera was specially mounted in each sub's main viewing port. Powerful nickel-iron batteries enable the submersibles to stay underwater for up to 20 hours and to power the specially-designed, high intensity (HMI) lights.

Audiences are literally seeing the *Titanic* in a new light. To film the wreckage site in the giant screen format, the expedition needed powerful broad lighting. Previously used for underwater filming, ordinary tungsten or quartz-iodide lights are capable of illuminating only 8-10 feet (2.5-3 metres). The HMI lights specially developed for this underwater mission allowed IMAX cameras' lenses to penetrate up to 75 feet (23 metres) in the sunless sea. Each submersible powered 4,800 watts of HMI lights which is the equivalent of 1500 household 100-watt light bulbs. In addition to improving opportunities for underwater filming, this advanced lighting system helped the submersibles navigate in potentially dangerous areas.

Key Concepts

Listed below are important life and physical science concepts which may be reinforced by observations in the *Titanica* film.

- Oceanographic research and exploration have advanced in recent years with the development of specially-designed vessels equipped with sophisticated data collection instruments.
- Manned and unmanned submersibles have enabled scientists to explore and study once inaccessible areas of the deep ocean.
- Advances in technology have resulted in submersibles capable of making deeper dives and performing more complicated tasks.
- Improvements in technology have come about through the sharing of knowledge and information.

The following activities are intended to provide a selection of ideas for various age

levels. Please adapt the activities for your specific needs.

Activity Ideas

Have the students create a display on the development of remotely operated vehicles (ROV's) and submersibles and their roles in deep sea exploration. Include information on how deep the various vehicles could dive, tasks performed, data collected or discoveries each made.

New technologies have helped us to investigate the ocean and to benefit from its vast resources. To what extent have advances in technology enabled us to exploit ocean resources? Report on ocean resources, how these resources benefit mankind, and why it is important to protect the ocean.

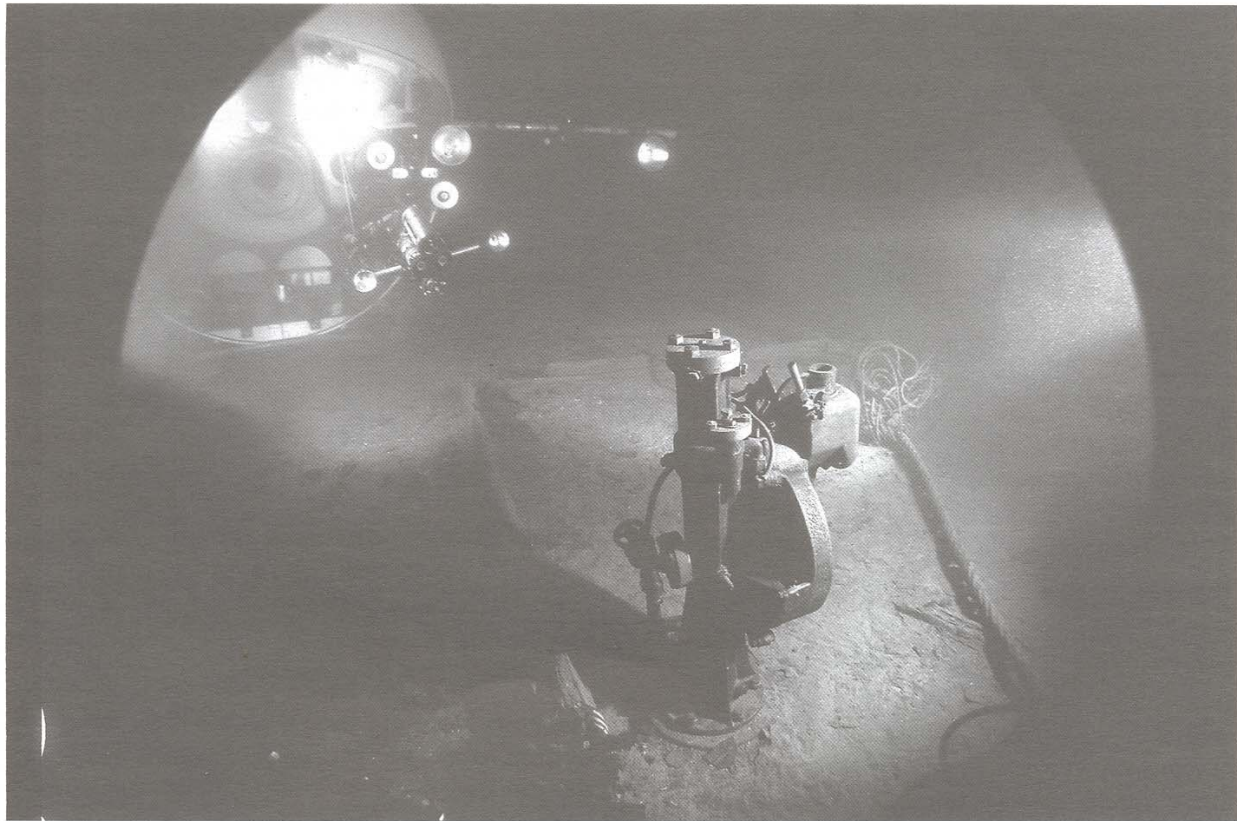
The first deep-water investigations were conducted aboard the H.M.S. *Challenger* (1872-76). The expedition's findings on the physical, chemical, geological and biological conditions of the ocean basins were published in 41 volumes. Learn more about the *Challenger* expedition, its findings and the types of equipment and instruments used to collect deep-water data in the 19th century.

The *Titanic* rests approximately 13.5 miles (21.6 km) southeast of the last CQD (SOS) position given in its distress messages. The discrepancy in longitude and latitude may not be due to human error but to inaccurate navigation techniques of the era. Compare modern navigation technology (use of satellites and electronic devices) with those used in 1912 (dead reckoning and celestial sightings).

Discussion Questions

Is exploring the ocean depths similar to exploring outer space? What are the conditions and requirements for human survival underwater and in outer space? Do you think it is more technologically challenging to explore outer space or the "inner space" of the ocean? Why?

The special lighting system developed for



The ship's telemotor with wooden wheel and handles eaten away. The submersible MIR I is in the background.
©Imax Corporation/TMP (1991) Limited Partnership

the IMAX/Titanic Expedition was first used in Hollywood and then adapted to underwater filming. What are other examples in which technology from one field has benefited another? Students may want to consider examples from the space program.

Discuss the advantages and disadvantages of manned vs. unmanned submersibles in deep ocean exploration. For example, what precautions must be taken for manned dives? What tasks can robotic vehicles perform that manned vessels cannot? What human abilities are superior to robotic technology?

Creative Writing

Have the students write about participating in a deep ocean dive. What special qualities or abilities must they possess to undertake a

deep ocean dive? How might they feel confined to a tiny, cramped submersible cabin for up to 20 hours? What might they see as they descend to the ocean floor 12,500 feet below the surface.

Career Clues

Launching an expedition to study and film the *Titanic* requires the talents and skills of many professionals: biologists, geologists, mechanical engineers, underwater photographers, submersible pilots, and historians in addition to the film production and ship's crews. Ask the students to choose one of the specialized jobs seen in the film and find out specifics about that profession.

Contact government agencies, marine research institutes or universities to learn more about careers in oceanography. What education requirements and specialized training are needed?

2000 FATHOMS DOWN

Two and a half miles (4 km) beneath the Atlantic Ocean's surface exists a world of perpetual darkness. Here, there is no day and night nor seasonal changes.

Temperatures perpetually hover near freezing. The IMAX Expedition sought to learn how this abyssal environment has affected the *Titanic*, and, in turn, how the *Titanic* has influenced this environment.

The *Titanic* wreckage site has provided scientists with new clues about patterns of life in the deep ocean, the deterioration and migration of metals in the ocean sediments, sediment accumulation and movement rates, and the possible ecological consequences of dumping toxic wastes into this environment.

The *Titanic* lies on the floor of a deep ocean valley on the continental rise on top of a massive ancient undersea landslide. Core samples taken in this area reveal that the underlying sediment is a very dense mixture of mud, sand and gravel. The high density of these deposits helps to explain why the *Titanic* and its debris were not buried in mud and ooze typical of the deep ocean bottom.

A steady rain of particulate matter from upper ocean levels has coated the wreck with sediment. Bottom currents of 1/4-1/2 knots or higher seep through the area with a dominant direction but with considerable irregularity. These currents are constantly moving and shifting bottom sediments.

Dangling stalactites of rust encrust the *Titanic's* cold hard steel. Rivers of rust directed by gravitational forces flow from the wreck. Two natural processes, chemical and biological, are corroding the *Titanic* at a rate that is poorly understood. Sea water has reacted with the metal but the biological process appears to be more destructive. Iron and sulphur metabolizing bacteria created these "rusticles". Oxidizing the iron as an inorganic source of energy, the bacteria leave rust particles as waste products.

On the featureless bottom, the *Titanic* has created a hard surface on which soft corals, anemones, hydroids and sponges attach. Shrimp, starfish, crabs and rattail fish find shelter in the wreckage. The liner provided a titanic feast for wood-boring mollusks, bacteria and other tiny organisms which consume organic material. Expedition scientists found 28 species of invertebrates and 4 species of fish inhabiting the wreckage site. The *Titanic* appears to have created a new habitat for these bottom-dwelling creatures.

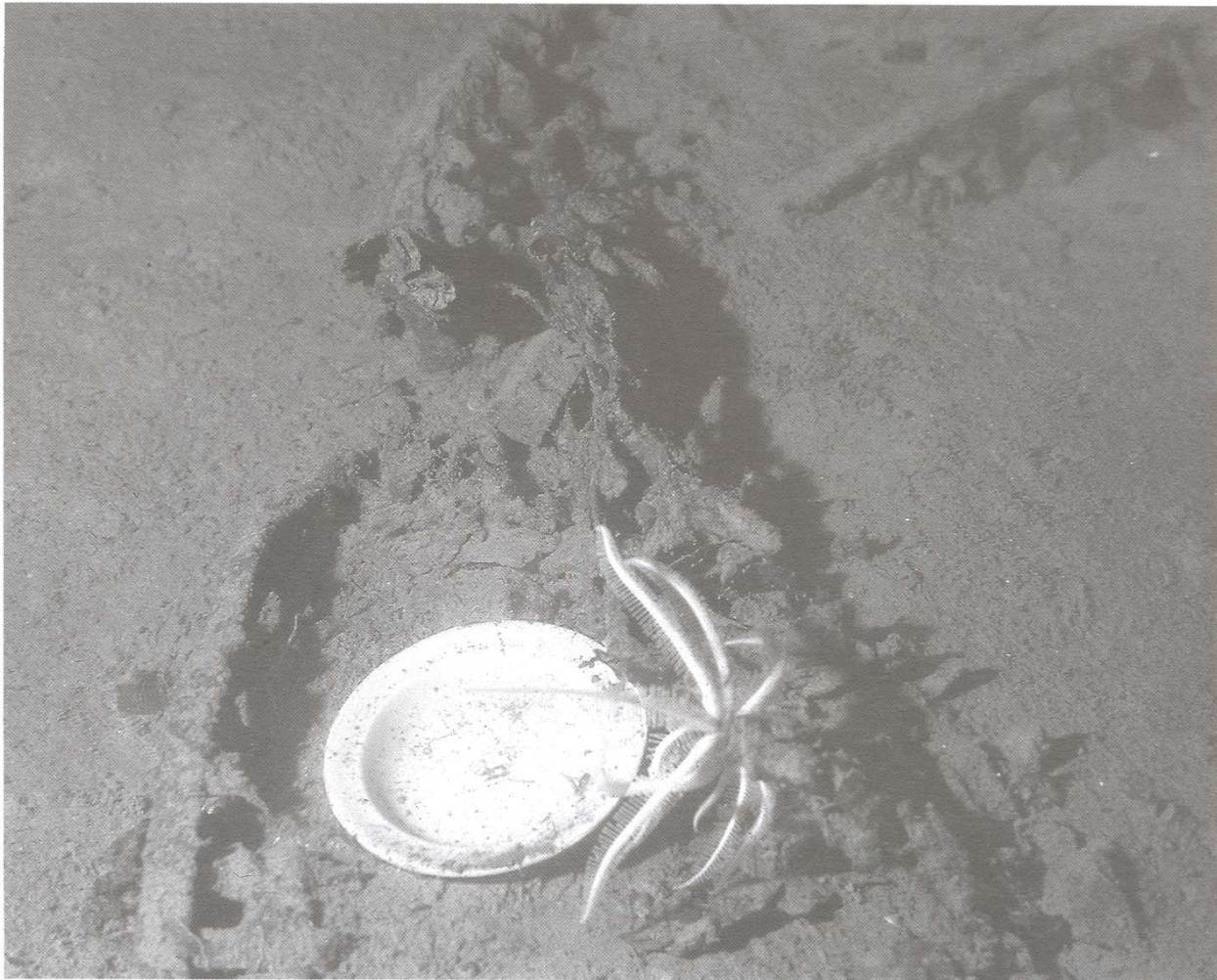
Although the ocean covers 70% of the Earth, it remains the last frontier. With huge plains, giant mountains and deep valleys, vast sections of this "inner space" remain unexplored and uncharted. The ocean is a fascinating place we are only beginning to investigate and to understand.

Findings from the IMAX Expedition have helped to change public perception that the deep ocean floor is isolated, inert, inactive and void of life. Scientists confirm that we need to reconsider using the ocean floor as a "giant garbage can" for toxic and radioactive waste.

Key Concepts

Listed below are life, earth and physical science concepts which will be reinforced by observations in the *Titanica* film:

- The ocean's abyssal zone is a dynamic and biologically active environment.
- Significant bottom currents exist at 2.5 miles (4 km) beneath the ocean's surface.
- Scientists learn about the earth's geologic history by drilling into the ocean floor and studying core samples.
- Normal atmospheric pressure at sea level is 14.6 pounds per square inch. Two and a half miles (4 km) underwater, the pressure is 6000 pounds per square inch. Humans could not survive unprotected at this pressure.
- The *Titanic* has become a time gauge to help scientists study the environmental



A starfish lies near a dinner plate showing the White Star Line's emblem. ©Imax Corporation/TMP (1991) | Limited Partnership

- processes of the deep ocean.
- Underwater chemical and biological processes are corroding the remains of the *Titanic*.

The following activities are intended to provide a selection of ideas for various age levels. Please adapt the activities to your specific needs.

Activity Ideas

Create a bulletin board display of the various life zones in the ocean. Include depth levels, geological features, environmental conditions and examples of life forms found in each zone.

Visit a local aquarium or use library

resources to learn more about marine invertebrates or life forms recently discovered in deep ocean trenches.

Investigate how other man-made structures have influenced or affected the abundance, distribution and diversity of marine organisms around them (e.g. artificial reefs in tropical waters; off-shore oil rigs).

Investigate the effects of increased pressure on various types of materials. What effects of deep ocean pressure on the *Titanic* were evident in the film?

Expedition scientists took core samples of the ocean floor around the *Titanic*.

Investigate how core samples are taken and

2000 FATHOMS DOWN



The *Titanic* off the Isle of Wight, as she sets sail from Southampton, England in April 1912.

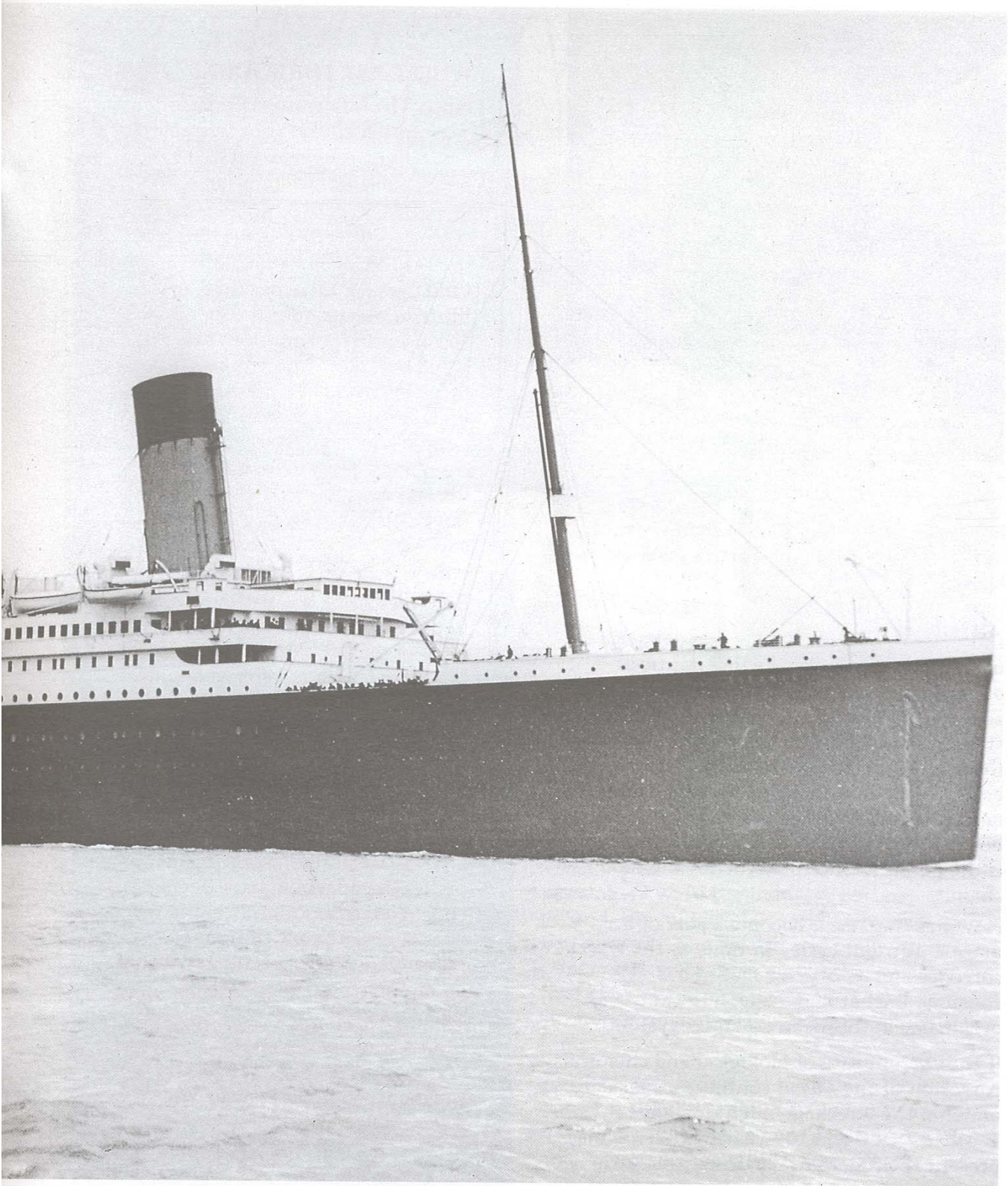


PHOTO CREDIT: *Beken of Cotoes*



A rattail fish casually swims by the debris field.
©Imax Corporation/TMP (1991) Limited Partnership

how scientists study “two million years of mud” to learn about the Earth’s geologic history.

Discussion Questions

Discuss the possible effects and dangers of using this area in the North Atlantic or other deep ocean sites to dump toxic, radioactive and other types of wastes. Have the students consider the effects of pressure on the waste canisters, the density of the bottom sediment (would they sink in or sit on top?), and the direction and speed of bottom currents. Perhaps most importantly, is the potential interaction with the food chain.

How has the *Titanic* become a part of a marine nutrient cycle? In time, as the wreck corrodes and its organic material is consumed, what may happen to the organisms in this deep ocean ecosystem?

If the current rate of biological and chemical corrosion of the *Titanic* continues, speculate on what the wreckage might look like in another 25, 50 and 100 years. Students may present their ideas orally, in writing or in drawings.

WHERE ARE THE BODIES?

Note: The following material is provided for your information. You will want to consider the emotional maturity of your students before introducing and discussing this material.

One thousand five hundred and thirteen people perished when the *Titanic* sank on April 15, 1912. What became of the remains of these lost souls? Witnesses in lifeboats related that hundreds of people jumped or were thrown from the sinking ship. Buoyed by life jackets, these people survived the sinking of the *Titanic* only to succumb to hypothermia and exposure to 28°F (–2°C) water.

Recovery ships later recovered 336 bodies. Coroners confirmed that most of these victims did not drown but froze to death. Why were only 336 bodies recovered? It is believed that the other bodies eventually sank or were carried away by ocean currents. An unknown number of passengers and crew caught below deck drowned as the ship sank.

On the ocean floor, soft organic matter (flesh) would have been consumed by bottom-dwelling fish, crustaceans and other marine scavengers. Bones eventually would be dissolved by the salt water.

The IMAX/*Titanic* Expedition filmed some personal relics scattered in the debris field, a poignant reminder that the *Titanic* is a symbolic grave site.

THE TITANIC AND HER ERA



The grand staircase shows the luxurious style of the *Titanic*. PHOTO CREDIT: Ulster Folk and Transport Museum

Although the *Titanic* is rarely mentioned in modern history textbooks, she is a subject worthy of further study in order to understand the era in which she was conceived and built. The *Titanic* was a microcosm of Edwardian England, Europe and North America as the ship reflected the social values, economics and politics of her period.

People of this era had benefited from the Second Industrial Revolution. Science and technology were going to improve society. There was steel, electricity, new chemicals, the telephone. The *Titanic* was testimony to the latest technological advances by her design, safety features, comforts and labor-saving devices. She also could ship passengers' automobiles!

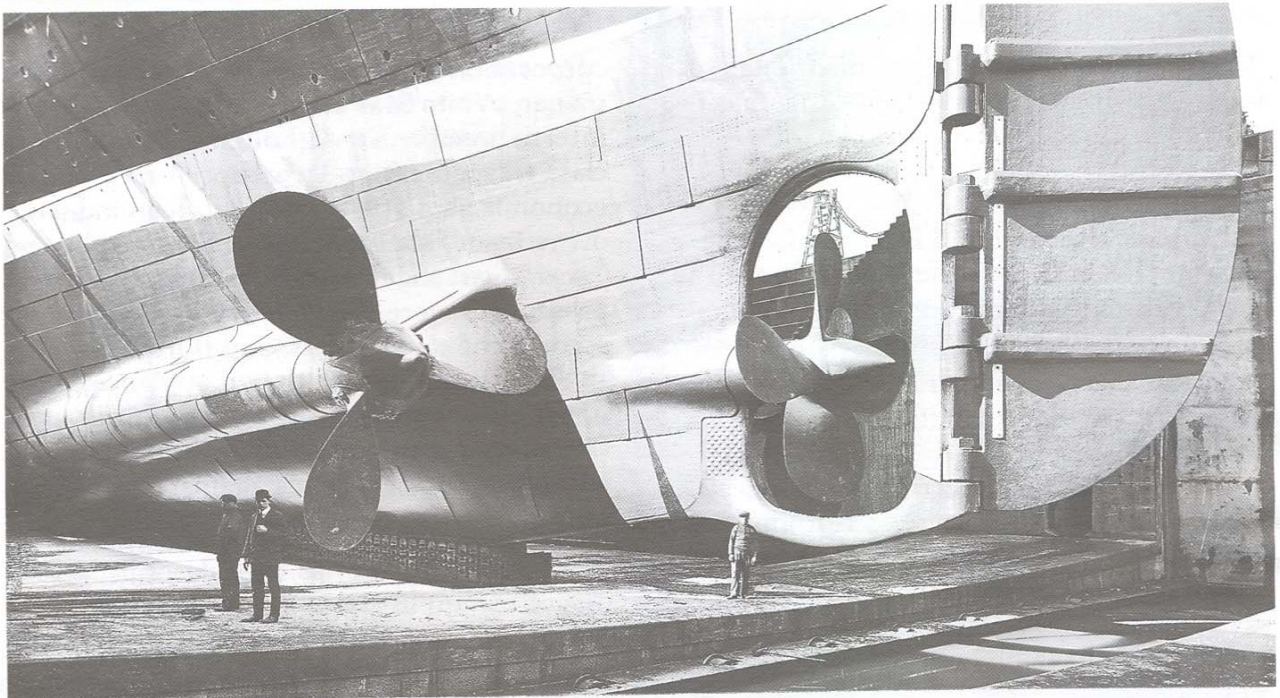
This was the age of industrial capitalism, the

corporation and monopolies. The *Titanic's* owner, White Star Line, was part of an international trust. Although the middle class was increasing, great social and economic gaps still existed between industry owners and laborers. This is reflected in the *Titanic's* passenger roster: the first class passengers were the industry barons; second, the middle class; and third class were the laborers. The wealth and opulence of the upper class were mirrored in the *Titanic's* first class accommodations and these survivors' damage claims against White Star Line.

The Edwardian Era has been described as one of tranquility, gentility and graciousness, but it was also an era of turmoil, strife and economic inequality. World War I was only two years away. There was social and



This first class salon reflects the Edwardian era standard of luxury aboard the *Titanic*.
Photo Credit: Ulster Folk and Transport Museum



Workers in dry dock stand in front of the *Olympic's* giant stern, which is identical in size to its sister ship, the *RMS Titanic*.
Photo Credit: Ulster Folk and Transport Museum

political turmoil in Russia and the Balkan states. Tensions increased between Great Britain and Germany as they jockeyed for naval supremacy. The *Titanic* was testimony to Britain's maritime superiority and she carried emigrants from Europe and the Middle East seeking economic and social freedom in the New World.

The *Titanic* was more than a ship; she was floating history.

Key Concepts

Listed below are important history and social studies concepts which may be reinforced by observations in the *Titanica* film.

- The Second Industrial Revolution has brought about new technologies and inventions which improved the quality of life.
- Europe and North America were undergoing social, economic and political changes in the early 1900's.
- People from eastern and southern Europe as well as the Middle East were emigrating to North America to escape adverse social, economic and political conditions.
- The *Titanic* was a microcosm of her era.

The following activities are intended to provide a selection of ideas for various age levels. Please adapt the activities for your specific needs.

Activity Ideas

Using a pre-World War I map of the world (available in an historical atlas), identify the nations that existed in 1912. Which nations appeared to be the most powerful? Compare the pre-war map with a present day map of the world. How have national boundaries changed?

Using library resources, archival materials and periodicals from this period, create a display of what life was like in 1912. What type of clothes did people wear? What was a typical meal? What were their homes like? What music was popular? What did people

do for entertainment and recreation? Include examples of the latest inventions and labor-saving devices.

Sometimes it takes a major disaster like the sinking of the *Titanic* to change outdated laws and regulations. Research the *Titanic's* legacy to safety. What standards, provisions, regulations and safety measures were instituted? Have any of these measures or regulations been updated in recent years?

Although Afro-American newspapers virtually ignored the *Titanic* disaster in 1912, Blacks' interest in the ship's sinking took a unique form: a poem that reflected Black consciousness in the early 20th century. Read "*Titanic Toast*." (Several versions are available in print.) What does this poem reflect? Why do you think Afro-Americans felt this way? What were social, economic and political conditions like for Afro-Americans during this period?

The *Titanic* has come to symbolize a catastrophic disaster or error in judgment. Have the students collect examples or discuss the use of the *Titanic's* symbolic image in contemporary political cartoons, advertisements, literature, etc.

Discussion Questions

The *Titanic* disaster was a profoundly moving experience for people in 1912. Eighty years later, it may be difficult for students to understand this surge of emotion, horror and disbelief. To help students understand the emotional tone of the time, ask those who are old enough to recall the space shuttle *Challenger* explosion in 1986. Have them express what their feelings, emotions and reactions were to this tragic event.

Could a disaster like the *Titanic* happen again? Some people believe it was a matter of time before man's over-confidence in technology would once again cause a tragic accident. They point to the space shuttle *Challenger* explosion and the Chernobyl nuclear accident as recent examples. What do you think?

THE TITANIC: AN UNSINKABLE SUBJECT



A side view of the gymnasium windows on the first class deck.
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The following activities are intended to provide a selection of ideas for various grade levels in a number of curricular areas. Please adapt these activities to your specific needs.

Activity Ideas

Some people have pointed out similarities between the space shuttle *Challenger* explosion and the *Titanic* sinking: Both were victims of ice, a hurried schedule, a lack of communication, and lack of adequate escape equipment. Have the students investigate both accidents. What similarities, if any, did they find? Could either or both of these accidents have been avoided or prevented?

Discussion Questions

In 1912, feminists in the United States and Great Britain were seeking emancipation for

women and the right to vote. The *Titanic* disaster, where the life saving policy was “women and children first”, highlighted a problem feminists had not previously considered: true equality means equal risk of life with men in times of adversity. Discuss this issue with the class. Is it still relevant today? Would the “women and children first” rule be used today on a sinking vessel? Science often transcends politics and ideologies. The IMAX/*Titanic* Expedition was a cooperative venture of people from three nations: Canada, the United States and the Soviet Union (now Russia). Have the students discuss if this type of cooperative mission with the Soviet Union would have been possible 10-15 years ago. How do they think the recent break up of the former Soviet Union will influence future cooperative scientific ventures? Have

students research other examples where scientific ventures have transcended politics (i.e. the space program, Antarctica exploration).

In 1987, a French expedition recovered 1892 artifacts from the *Titanic*. Some of these artifacts have been restored and are now part of a traveling exhibit. The salvaging of *Titanic* artifacts has sparked many debates. Although artifacts have been recovered from other sunken vessels, why do you think some people feel differently about the *Titanic*? What were the attitudes of the IMAX/*Titanic* Expedition team members about taking artifacts? Arrange a class debate to explore both sides of this controversial issue. What arguments can be made for salvaging *Titanic* artifacts? Should *Titanic* artifacts be sold to collectors? Put on display only?

Survivor Eva Hart comments in the film that someday there may be a disaster greater than the sinking of the *Titanic*. This time, she says, there may be no lifeboats. Discuss what Miss Hart's statement could mean. Do you think she is referring to a technological disaster? Or, perhaps, is this a reference to our planet? How might our present situation on Earth be similar to the *Titanic* on her maiden voyage? Are there any lifeboats for the planet?

Creative Arts and Writing

Seeing the *Titanic* wreckage evoked many reactions and feelings from members of the IMAX/*Titanic* Expedition. Have the students express their reactions to seeing images of the *Titanic* on the giant screen. How did they feel when they saw the wreck? What were their thoughts? Encourage them to express their impressions in prose, verse or free form poetry.

Suppose you could transform the *Titanic* into an "underwater museum" with people touring the wreckage site in submersibles. Develop a brochure or advertisement

describing what visitors would see and experience in their underwater tour.

Titanic survivor Eva Hart's family was moving from England to Canada where her father was to start a new business. Write a short story, play or skit about what it might be like if you and your family were moving to a country overseas to start a new life. You may want to consider the emotional, physical and social adjustments you would have to make.

HOW DID AN ICEBERG SINK THE TITANIC?

For decades, many people believed the iceberg ripped open a 300-foot (92 metre) gash in the liner's starboard bow allowing tons of sea water to flood six watertight compartments. Although the damaged area is hidden in the bottom sediment, the 1986 Woods Hole Oceanograph Institute expedition found no evidence to suggest that the iceberg created a continuous gash in the hull. Dr. Robert Ballard suggested that the collision with the iceberg caused the ship's steel plates to buckle and rivets to pop, allowing water to pour through the hull plates' loosened seams.

The IMAX/*Titanic* Expedition retrieved pieces of the *Titanic's* steel plates. Metallurgy tests revealed that the steel plates were brittle. Scientists concluded that the hull plates may have shattered upon impact with the iceberg.

In 1912 there were limited industry standards for forging steel, no quality control or tests for brittleness. The "steel plate" forged in 1912 was not like the high-quality steel made today.



A lady's shoe lies as a grim reminder that lives were lost. ©Imax Corporation/TMP (1991) Limited Partnership



Using a special photographic process combining an original archival photograph and reenactment with actors, some scenes re-create life aboard the *Titanic*. Here the Hart family is depicted on deck. Photo Credit: Ulster Folk and Transport Museum

EDUCATIONAL RESOURCES

The resources listed below represent a small selection of the many publications currently available on the *Titanic*. The list is by no means complete and inclusion on the list does not constitute endorsement by Imax Corporation. You will find a wealth of information in your school and public libraries on the *Titanic*, oceanography, and deep sea exploration.

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ORGANIZATIONS

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P.O. Box 51053
Indian Orchard, Mass. 01151-0053
U.S.A.

Titanic International Inc.
P.O. Box 7007
Freehold, New Jersey 07728
U.S.A.

British Titanic Society
P.O. Box 401
Hope Carr Way
Leigh, Lancashire WN7 5WW
United Kingdom



Bottles of wine lay uncorked on seafloor. ©Imax Corporation/TMP (1991) I Limited Partnership

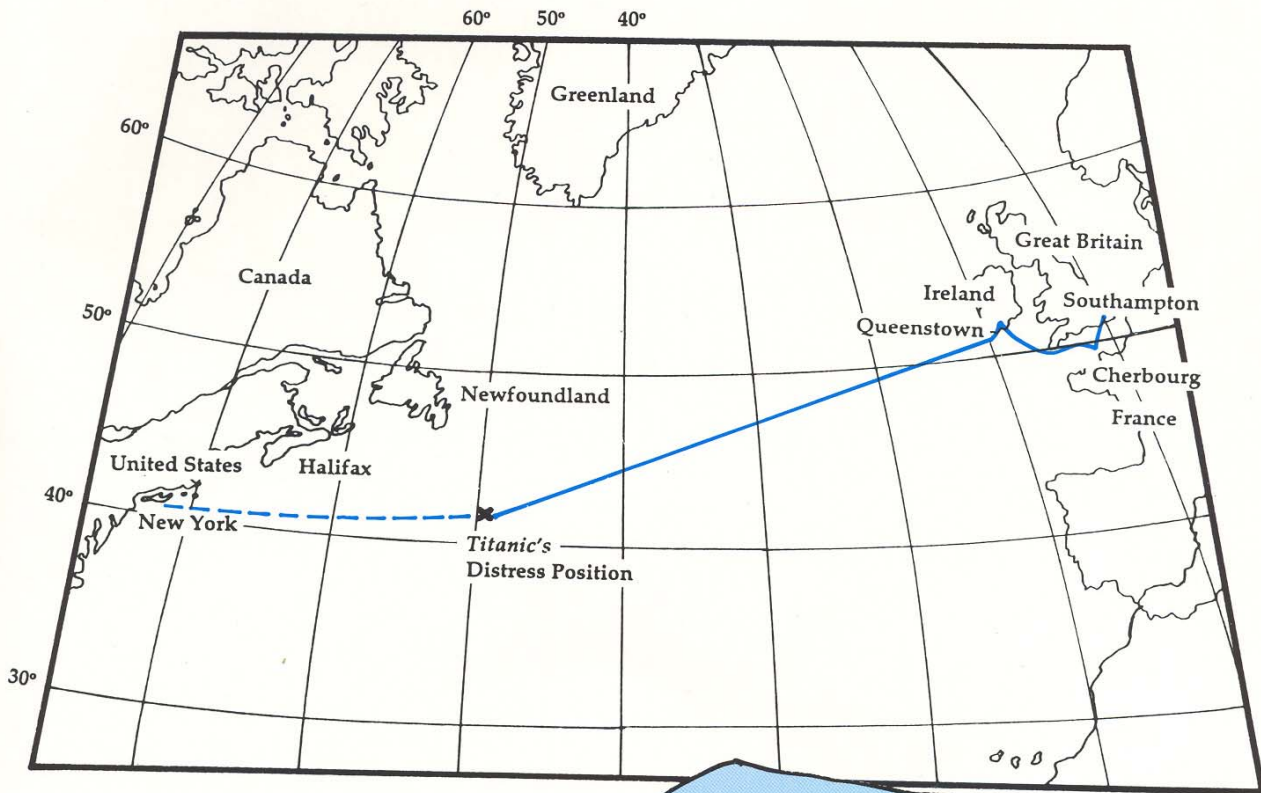


Director Stephen Low and submersible pilot Genya Chernjaev with IMAX camera inside MIR.
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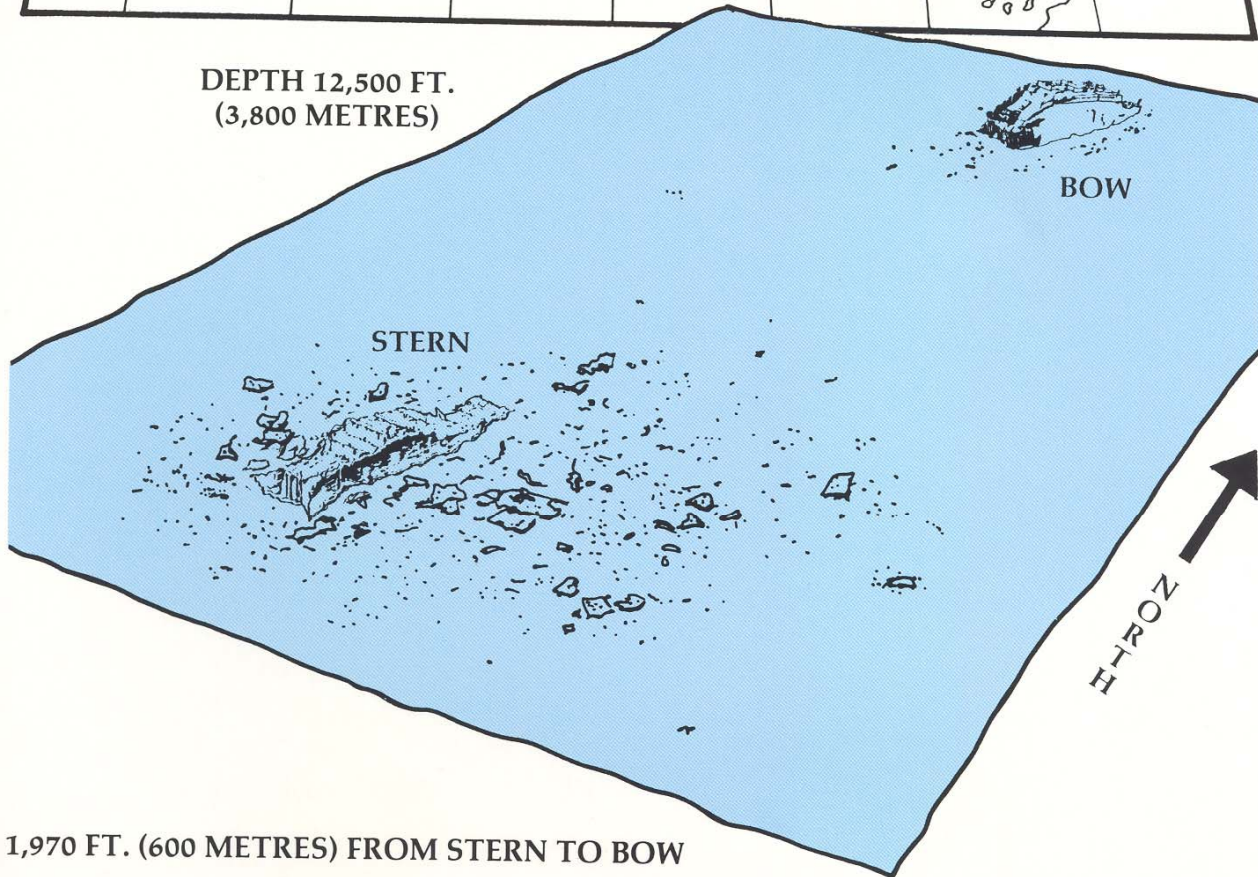
GLOSSARY

- Abyss.** The bottom reaches of the ocean beyond the relatively shallow continental shelf.
- Bow.** Forward end of a ship.
- Bulkhead.** Upright partition dividing the interior or hull of a ship into compartments.
- Collapsibles.** Wooden bottom lifeboats with canvas sides. The canvas sides were collapsed for stowing and raised when in use.
- Continental Shelf.** The smooth, gently sloping portion of the ocean floor that borders the coastlines of a continent.
- Core Sample.** Cylindrical sample taken through layers of ocean sediments, earth or ice.
- CQD.** Morse code distress call used by ships at sea in the first years of wireless telegraphy. It was replaced by SOS. *Titanic* operators used both methods in their distress calls.
- Crustaceans.** A class of aquatic invertebrates that includes shrimp, crabs, lobsters and barnacles.
- Debris Field.** The area between the *Titanic's* separated bow and stern sections where many of the ship's objects were found.
- Ecosystem.** All the living organisms and the physical environment within a specific area and the relationship between them.
- HMI Lights.** A compact high efficiency light source that produces a near daylight or "blue" spectrum. The name is derived from "H" for mercury (Hg), "M" for metals (dysprosium, thulium, holmium), and "I" for halogen compounds (iodide and bromide).
- Hull Plates.** Metal plates joined together and covering a ship's hull frame.
- Hydroids.** Plantlike marine invertebrates related to corals and jellyfish.
- Hypothermia.** A drop in normal body temperature which can cause death.
- Invertebrate.** Animal without a spinal column or backbone.
- Knot.** Measure of a ship's speed equivalent to one nautical mile per hour or 1.5 statute miles per hour.
- Mir I and II.** Advanced manned research submersibles. The name means "peace" in Russian.
- Marine.** Relating to the seas, oceans or ships.
- Marine Geology.** The study of the formation and history of the earth under the seas.
- Metallurgy.** The science and technology of metals.
- Oceanography.** The scientific study of the oceans, their chemistry, biology, physical features and resources.
- Oceanology.** The science of marine resources and technology.
- Port.** Left side of a ship when on board facing the bow.
- Rattail Fish.** Deep water, bottom-dwelling fish related to the cod.
- ROV.** "Remotely Operated Vehicle." Self-propelled underwater exploration robot attached by a tether to a support ship.
- Rusticles.** Very fragile reddish-brown stalactites of rust caused by iron and sulphur metabolizing bacteria.
- Scavenger.** Animal that feed on dead animals.
- Sediment.** Deposits of sand and mud carried into the ocean by rivers.
- Starboard.** Right side of a ship when on board facing the bow.
- Stern.** Rear of a ship.
- Submersible.** Underwater vessel which requires a support ship to transport it to the diving area, launch it, and to recover it.

DEBRIS FIELD



DEPTH 12,500 FT.
(3,800 METRES)



1,970 FT. (600 METRES) FROM STERN TO BOW

TITANICA