NOVA

Original broadcast: February 28, 2006 PBS

Arctic Passage

PROGRAM OVERVIEW

NOVA recreates the expeditions of Sir John Franklin and Roald Amundsen, two Arctic explorers who set out to find the legendary Arctic sea route known as the Northwest Passage.

Hour one of the program:

- tells how Sir John Franklin and his British Admiralty crew of 128 men set out in May of 1845 with two ships to find the mythical route connecting the Atlantic and Pacific Oceans.
- notes the food and other provisions brought on the journey.
- presents the types of evidence that historians relied on to determine what happened to the expedition—artifacts that included a written note, ice core data, interviews with Inuit, and forensic analysis of body remains.
- pieces together an account of where expedition members traveled and how they may have died.
- explains how Franklin and 20 percent of his crew died two years into the expedition; the final four crew members died after six years on the ice.
- reports that the search for the men was officially called off in 1859.

Hour two of the program:

- relates how Amundsen became a polar explorer.
- explains why Amundsen chose to make the journey in a small converted fishing boat rather than a large ship, setting out from Oslo in 1903 with a six-man crew.
- reports on some of the challenges the expedition faced, including a fire and running aground.
- recounts the path the Norwegian explorer took through the passage.
- reveals how Amundsen befriended the Inuit and notes ways that both the explorers and the Inuit were affected by the relationship between the two cultures.
- tells of Amundsen's successful completion of the passage on August 26, 1905.
- relates how Amundsen went on to be the first person to reach the South Pole on December 14, 1911.

BEFORE WATCHING

1 The Northwest Passage is the sea route linking the Atlantic and Pacific Oceans. The Franklin Expedition traveled from England to western Greenland through what is now Baffin Bay, then on to Resolute Island. Some believe the crew made it as far as King William Island. Have students plot the Northwest Passage on a map and estimate its distance.

2 Organize the class into five teams. As they watch the program, have four of the teams track one of the following types of evidence related to why the expedition failed: diseases, health issues and physical remains; ship-related artifacts; Inuit testimony; and written notes and journals. Have a fifth group keep track of when events occurred.

AFTER WATCHING

1 Have students refer to their notes and share what they learned, beginning with the team that took notes on when events occurred (have this team write the sequence of events on the board). Each team should report and add its findings to the time line. Ask students to share which theory of why the men became ill and died they believe is most likely and why.

2 Discuss with students what conditions were like for the men on the Franklin Expedition. What were the hardships? The pleasures? What technologies were available to them? What technologies are available today that did not exist in 1845? *(Some technologies available today include advanced ice-breaking equipment, Global Positioning System navigation, nutrient supplements, better preservation methods for food, synthetic fibers for clothes, and antibiotics and other medications.)*

CLASSROOM ACTIVITY

Activity Summary

Students will plan a survival pack for severe Antarctic weather.

Materials for Each Student

- copy of "Icy Survival" student handout
- copy of "Antarctic Conditions Fact Sheet" student handout

Background

One of the reasons that Roald Amundsen survived and conquered the Northwest Passage when those before him had failed was that he chose to work with the environment rather than try to conquer it. He set sail in a small ship with a six-man crew and learned about survival from the Inuit who live there. This approach served him well: In 1905 he became the first explorer to navigate the passage.

Though today's polar researchers have more knowledge of the terrain and sophisticated navigational equipment, they, too, must think ahead and prepare well when they are working on the ice. These researchers often work in mobile teams that venture out on the ice to do research. They bring survival equipment in case conditions such as storms, accidents, or equipment failure prevent them from returning to camp. In this activity, students plan a standard survival pack that would enable them to endure severe Antarctic weather for 24 hours.

Procedure

1. Organize students into teams of four and distribute the handouts to each student.
2. Have students identify pack items they consider essential or not. After teams make their selections, have them compare lists, discuss how they would use their items, and revise their packs based on their discussions.
3. To conclude, have students consider what they would need to survive in a hot desert environment and compare items in both cold and hot packs and their reasons for including each.
4. As an extension, have students research and report on methods the Inuit use to survive in the Arctic.

LEARNING OBJECTIVES

Students will be able to:

- understand what factors play a part in keeping warm in the cold.
- identify items necessary for survival in extremely cold climates.

STANDARDS CONNECTION

The "Icy Survival" activity aligns with the following National Science Education Standards (see books.nap.edu/html/nses).

GRADES 5–8
Science Standard F
Science in Personal and Social Perspectives
Personal health
Risks and benefits

GRADES 9–12
Science Standard F
Science in Personal and Social Perspectives
Personal and community health
Natural and human-induced hazards

Video is not required for this activity.

Classroom Activity Author
This classroom activity originally appeared, in slightly different form, on NOVA's "Warnings From the Ice" Web site.

ACTIVITY ANSWER

Conditions are so extreme in Antarctica that scientists expend more energy on surviving than they do on research. In actuality there are several types of survival packs. There are first-aid packs, helicopter emergency transport packs, deep-field packs for those working distances away from the base camp, and packs for crevasse rescues. This activity uses a combination of items from the helicopter and deep-field packs.

In a worst-case scenario, a group might have to wait out a storm in order to make safe passage back to base camp. However, communication and transportation systems have become so advanced that it is unlikely anyone would be left for days. Students' choices for their packs may vary. Each group should choose a total of 16 items: eight items that are the same for each pack and eight items that are shared by the group (two per pack). Use the chart to the right as a general guide for determining essential and nonessential items.

Possible items for survival pack	Essential	Not Essential	Why?
individual first-aid kit	X		to treat wounds or illnesses
sleeping bag, thermal sleeping pad	X		to hold body heat in and keep cold out
socks/mittens/face mask	X		to have as spares in case originals are lost or get wet
gorp (nuts and raisins mix), chocolate bar	X		high-energy carbohydrates to keep digestive system working and release energy quickly
dehydrated food	X		carbohydrates to keep body warm
1/2 gallon water	X		to prevent dehydration (a serious problem in the dry Antarctic), and to rehydrate food
tent*	X		to provide shelter against wind and to protect body warmth
backpacking stove/kerosene*	X		to warm food and water, which freeze in a pack, for eating
matches*	X		to light stove
pot and pan set*	X		to prepare hot water and cook food
snow shovel/ice saw*	X		to build a snow wall to block wind for a tent, or to cut ice to make a shelter
sledgehammer*	X		to pound tent stakes into the frozen ground
radio with spare batteries*	X		to communicate with rescue team
signal mirror*	X		to signal rescue team
camera, book, pictures of someone you love, rifle, toilet paper		X	adds additional weight, not necessary to survive
beef jerky, cheese, 1/2 loaf bread		X	unusable when frozen and not high enough carbohydrate energy levels for quick energy release
blanket		X	not as efficient for holding in heat as sleeping bag
flashlight		X	not needed because there is constant daylight
drill, journal/pencil		X	for research, not an emergency situation
snowshoes		X	too cumbersome to carry; in severe weather, it is better to stay put and wait for help or for storm to end
suntan lotion		X	not needed because body will be protected by clothing
insect repellant		X	essentially no insects in Antarctic
cup/spoon		X	useful, but food can be eaten without these

* shared group items

ACTIVITY ANSWER

LINKS AND BOOKS

Links

NOVA—Arctic Passage
www.pbs.org/nova/arctic
Learn about the predicted future of the Northwest Passage, gain insight into Passage conqueror Roald Amundsen, see expedition maps, read a note left by Franklin's surviving men, view Franklin artifacts, and discover the secrets of building an igloo.

Sir John Franklin Expedition
www.canadiangeographic.ca/specialfeatures/franklinexpedition/default.asp
Details the expedition, and includes information about the ships and their captain.

The Fate of Franklin
www.ric.edu/rpotter/SJFranklin.html
Provides an overview of the Franklin expedition, including illustrations of Franklin, information about the Arctic region, and details about modern-day searches for Franklin.

Books

Across the Top of the World
by James P. Delgato.
Diane Publishing Company, 1999.
Describes tales and voyages of Arctic exploration and includes many maps, photos, and images from different eras.

The Arctic Fox: Francis Leopold McClintock, Discoverer of the Fate of Franklin
by David Murphy.
The Collins Press, 2004.
Tells a chronological narrative of McClintock's discoveries and draws upon private and published journals and letters.

Arctic Grail: The Quest for the Northwest Passage and the North Pole, 1818-1909
by Pierre Berton.
The Lyons Press, 2000.
Investigates the search for Sir John Franklin's lost expedition and incorporates an analysis of extensive research, diaries, and private journals.

Buried in Ice: The Mystery of a Lost Arctic Expedition
by Owen Beattie and John Geiger.
Scholastic, 1992.
Uses drawings, paintings, and historic and present-day photographs to illustrate a narrative of the failed Franklin expedition and provides insight into how the men died. Includes a fictional account of the passage as seen through the eyes of a 19-year-old member of the crew.

Major funding for NOVA is provided by Google and BP. Additional funding is provided by the Howard Hughes Medical Institute, the Corporation for Public Broadcasting, and public television viewers.

NOVA

Icy Survival

Your team has been assigned to drill ice cores 40 kilometers from base camp. You have been told that dangerous storms can happen without warning. You might need to wait out a storm. Your team must decide which items to put in each of your individual packs so that each team member could survive in severe weather for 24 hours. Choose carefully—your life might depend on it!

Procedure

1 Read the list of possible items and decide which are essential or not essential. Use the "Antarctic Conditions Fact Sheet" to help make decisions. Your main goals are to:
- protect your body temperature
- ensure a source of fluids
- ensure a source of calories

2 As a group, decide which 10 essential items you will bring. Each pack must contain:
- the same eight items per individual agreed on by all group members
- two additional items which will be shared by the group; these two items should be different for each member's pack

Possible items for survival pack	Essential	Not Essential	Why?
camera/flashlight			
matches			
drill			
snow shovel/ice saw			
tent			
sleeping bag			
1/2 loaf bread			
snowshoes			
journal/pencil			
backpacking stove/kerosene			
1/2 gallon water			
cheese			
beef jerky			
book			
chocolate bar			
picture of someone you love			
mittens/socks/face mask			
gorp (nuts and raisins mix)			
signal mirror			
rifle			
thermal sleeping pad			
blanket			
suntan lotion			
insect repellant			
dehydrated food			
cup/spoon			
individual first-aid kit			
pot and pan set			
sledgehammer			
radio with spare batteries			
toilet paper			

NOVA

Antarctic Conditions Fact Sheet

Land
Ice and snow cover 98 percent of the continent.

Climate
Winter extends from May through August. Summer extends from December through February. Temperatures during January and February range from -15°C to -35°C inland and reach up to 0°C along the coast. Antarctica's inland plateau has been called a polar desert. Very little moisture is in the air there, so dehydration can be a major concern for people working on the ice.

Wind and Wind Chill
Winds range from about 8 kilometers per hour to 64 kilometers per hour. Below freezing temperatures and high winds can lower the temperature to -100°C and decrease the visibility to less than 30 meters.

Storms
Storms arrive quickly. They can be very localized—the sun might be shining in one area while a severe snowstorm is happening just 80 kilometers away. Blowing snow can create "whiteout" conditions with zero visibility. Low clouds on the horizon contribute to low visibility and make it hard to see crevasses and cracks in the ice. When in unknown territory, it is advised to stay put during a storm.

Light
Due to the polar location, continuous daylight occurs during the summer, the time when scientists conduct their research.

Resources
Find more on cold weather survival and Antarctic weather at the following Web sites:

Antarctic Weather
www.antarcticconnection.com/antarctic/weather/index.shtml
Provides news and information about Antarctic weather.

Antarctica: The Frozen Continent
www.divediscover.whoi.edu/antarctica/weather.html
Supplies weather information and a method to estimate effective temperature.

Day-to-Day Polar Life
www.usatoday.com/weather/resources/askjack/ajckicel.htm
Considers what is needed to survive in Antarctica.

Outdoor Action Guide to Hypothermia and Cold Weather Injuries
www.princeton.edu/~oa/safety/hypocold.shtml
Reviews how the body loses heat to the environment, how the body regulates core temperature, and how to diagnose and treat hypothermia.