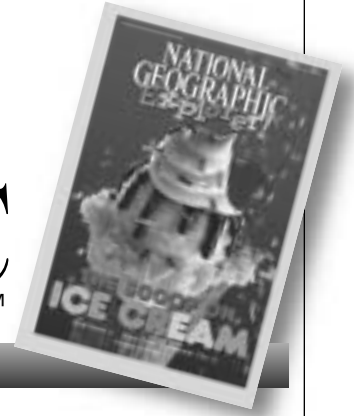


April-May 2003
Teacher's Guide
Vol. 2 No. 6

"FOR THE INCREASE
AND DIFFUSION OF
GEOGRAPHIC
KNOWLEDGE."

NATIONAL GEOGRAPHIC Explorer!™



This is the last NATIONAL GEOGRAPHIC EXPLORER for 2002–03. In this issue, students soar with the Wright brothers, dive to neon-colored coral reefs, and taste the history of ice cream. These stories should spark lively discussions.

We hope EXPLORER has been a valuable addition to your school year. During “summer vacation,” we’ll be selecting next year’s topics and exploring ways to make the magazine even better. Toward that end, we eagerly invite your comments, and we hope you will complete the curriculum survey on page TG 8.

Our letter for this issue is a special Earth Day message from the National Geographic Society.

Dear Teacher:

North America features an unparalleled spectrum of vital habitats ranging from scorching deserts to freezing tundra. Sadly, many of these ecosystems—and their irreplaceable biodiversity—face degradation or even destruction. As an educator, you can help students grasp how they are connected to America’s habitats.

We can help. *Geography Action!* is a National Geographic program to promote good stewardship of the environment. Our 2003 theme is “Habitats.” Program activities encourage students to explore—and conserve—the intricacies and mysteries of their local ecosystems.

You and your students can participate in *Geography Action!* by visiting www.nationalgeographic.com/geographyaction. The site is chock-full of habitat information, activities, and more. You can also encourage your students to take the “Kids Take Action! Be a Habitat Hero” challenge, detailed on the poster included with this issue of NATIONAL GEOGRAPHIC EXPLORER.

Together we can inspire our youth to protect Earth’s environment and conserve its resources.

Sincerely yours,

National Geographic Society

NATIONAL GEOGRAPHIC EXPLORER is a publication of the
NATIONAL GEOGRAPHIC SOCIETY brought to you in cooperation with the
INTERNATIONAL PAPER COMPANY FOUNDATION
and NATIONAL GEOGRAPHIC SOCIETY EDUCATION FOUNDATION

First Flight



Background

This year marks the 100th anniversary of the Wright brothers' historic flight at Kitty Hawk, North Carolina. This article explains how Wilbur and Orville Wright succeeded in designing, building, and flying the first real airplane in history.

As children, both Wilbur and Orville displayed curiosity, careful observation, and perseverance. The brothers made a good pair—one an intellectual, the other a tinkerer. As young men, they sold, repaired, and designed bikes. The Wrights became interested in creating a flying machine when they read about Otto Lilienthal, who built and flew gliders.

Studying the science of flight, the Wright brothers recognized that an aircraft had to have (1) wings that could create lift, (2) a source of power, and (3) a means for controlling the wings. To determine which wing shapes worked best, they tested models in a homemade wind tunnel. To provide power, they built an engine. To control the wings, they devised a way to warp, or twist, the tips—a technique learned by watching buzzards.

Wilbur and Orville Wright dubbed their machine *Flyer 1*. They tested it in December 1903. On the second try, the aircraft carried Orville under its own power in a controlled flight. The trip lasted 12 seconds, covered 120 feet, and opened the age of aviation.

Discussion Questions

- What character traits helped the Wright brothers become good inventors? (*Possible answers: They were curious, observant, and persevering. They liked to tinker with machines. They knew how to find information when they needed it.*)
- How did Otto Lilienthal influence the Wright

brothers? (*He built and tested gliders. His work sparked the Wright brothers' interest in flying.*)

- What did the Wrights learn from watching buzzards? (*The birds controlled their wings during flight by twisting the tips.*)
- Why did the brothers choose Kitty Hawk as a place to test their aircraft? (*At the beach they found strong, steady winds—and a soft landing.*)
- Why did the Wrights build a wind tunnel? (*To test shapes for wings and propellers*)
- How did the engine and the propellers work together? (*Bicycle chains connected the engine to the propellers, making them turn.*)
- Was *Flyer 1* a good name for the aircraft? Why or why not? (*Possible answer: Yes, because it was the first machine to fly under its own power.*)
- Explain how these key parts helped *Flyer 1* move: Rudders (*They made the plane turn left or right*); propellers (*They pushed the plane forward*); elevators (*They made the plane go up or down*).
- How do you think the work of the Wright brothers has changed history? (*Possible answers: Planes have changed transportation. Air travel brings people and countries closer.*)

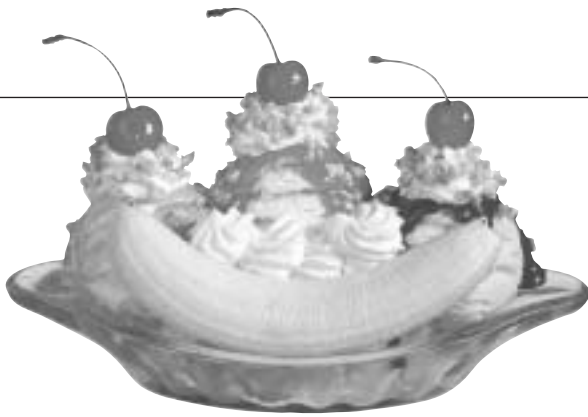
Book Link

Airborne: A Photobiography of Wilbur and Orville Wright by Mary Collins (National Geographic, 2003; 64 pages).



Web Link

Soar to great resources at www.nationalgeographic.com/ngexplorer/teachers.



Ice Cream

Background

Tradition traces the origins of ice cream to the Roman emperor Nero, who served “sweet snow” at his feasts. Historians are more likely to focus on the 1600s, when wealthy Europeans served “water ices” at dinners. Cooks eventually added cream to enrich the taste and molded the treat into fancy shapes.

In the United States, the story of ice cream reflects innovation and industrialization—forces that have affected many aspects of American life. Nancy Johnson’s hand-cranked machine made it easier to make ice cream at home, and Jacob Fussell’s factory produced affordable ice cream for retail outlets. As a result, a treat once limited to the rich and royal became part of popular culture.

Ice cream is also a tasty example of how immigration enriches American life. Ernest Hamwi (widely credited with inventing the ice cream cone), Christian Nelson (ice cream bar), and Thomas Carvelas (soft ice cream) were all immigrants.

Clever marketing has also influenced Americans’ appetite for ice cream. Thomas Carvelas placed his stands along carefully selected highways to lure car-loving customers. Recent decades saw the advent of “superpremium” brands—rich, pricey, and hugely popular.

Discussion Questions

- How did the use of ice cream change from its Old World origins to its place in the United States today? (*Ice cream was originally only for royalty and the rich. Inventions and mass production have made it available to most Americans.*)
- What details in this article show that ice cream is important to the U.S. economy? (*The U.S. produces 1.6 billion gallons of frozen deserts each year. Americans spend almost \$20 billion annually on ice cream.*)
- How did Thomas Jefferson influence the history of ice cream in the United States? (*He probably introduced vanilla to the U.S.*)

- Why was Nancy Johnson’s invention important? (*Her hand-cranked machine made it easier to make ice cream at home.*)
- How did ice factories encourage Americans’ love affair with ice cream? (*Factory-made ice cream was cheaper, so more people could afford the tasty treat.*)
- How did Thomas Carvelas take advantage of Americans’ love of cars to sell ice cream? (*He opened shops along highways.*)
- What was an advantage of the ice cream cone? (*People could walk around as they ate.*)
- Why do you think expensive ice creams in unusual flavors are becoming so popular today? (*Answers will vary.*)

Book Link

Chocolate, Strawberry, and Vanilla: A History of American Ice Cream by Anne Cooper Funderburg (Bowling Green, 1995; 211 pages).



Web Link







Devour ice cream information at www.nationalgeographic.com/ngexplorer/teachers.

NATIONAL GEOGRAPHIC EXPLORER (ISSN 1536-1101) is published six times during the school year—September, October, November–December, January–February, March, and April–May—by the National Geographic Society, 1145 17th Street NW, Washington, DC 20036.







Postmaster: Send address changes to NATIONAL GEOGRAPHIC EXPLORER, P.O. Box 10597, Des Moines, IA 50340-0597. Periodical postage paid at Washington, DC, and additional mailing offices.

U.S. Classroom Price: \$4.95 per student per year (10 to 199 subscriptions to same address). U.S. School Price: \$2.50 per student per year (200 or more subscriptions to same address). **To subscribe, call 1-800-368-2728.**

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ARTICLE/ DEPARTMENT	Reading	Writing	Science	Social Studies	CONTENT OVERVIEW (L) Literacy Skills (T) Topics
 <p>Geo News pp. 2–3</p>	■		■	■	(L) Reading for information (L) Reading a bar graph (T) Space Day (T) Summer activities (T) Water conservation (T) Wildlife issues
 <p>Teaching Unit “First Flight” pp. 4–9 ■ Feature Article ■ Big Picture</p>	■		■	■	(L) Reading for information (L) Developing vocabulary (T) Aviation history (T) Inventors (T) Physical science (T) Wilbur and Orville Wright
 <p>Big Picture “Flyer 1” pp. 10–11</p>	■		■		(L) Reading a diagram (T) Aviation history (T) Technology (T) Wright brothers
 <p>Teaching Unit “Ice Cream” pp. 12–17 ■ Feature Article ■ Hands-on Math ■ Writing Workshop reproducible</p>	■	■		■	(L) Reading for information (L) Reading a time line (L) Conducting a survey (T) Cultural changes (T) Food (T) U.S. history
 <p>Teaching Unit “Coral Reefs: Cities in the Sea” pp. 18–23 ■ Feature Article ■ On the Map</p>	■		■		(L) Reading for information (T) Biology (T) Environmental issues (T) Reef ecosystems (T) Reef formation (T) Symbiotic relationship
 <p>On the Map “Coral Crossword Puzzle” p. 23</p>	■		■	■	(L) Reading a map (L) Drawing conclusions (T) Reef locations (T) Tropic of Cancer (T) Tropic of Capricorn

Issue at a Glance

<p style="text-align: center;">DIRECTED ACTIVITY</p>	<p style="text-align: center;">SMALL GROUP ACTIVITY</p>	<p style="text-align: center;">INDEPENDENT ACTIVITY</p>
<ul style="list-style-type: none"> ■ Read and discuss the news items on pp. 2–3. ■ Use “Water Watch” to discuss Earth Day and how kids can protect Earth’s resources. <p>20 minutes</p> 		
<ul style="list-style-type: none"> ■ Ask students why the 100th anniversary of the Wright brothers’ flight is cause for celebration. ■ Read the article. ■ Discuss the questions on p. TG 2. <p>60 minutes</p> 	<ul style="list-style-type: none"> ■ Form “TV crews” and have them imagine being at Kitty Hawk in 1903. How would they cover the Wright brothers? <p>Time will vary.</p>	<ul style="list-style-type: none"> ■ Find out how airplanes fly at www.nationalgeographic.com/ngexplorer/quickflicks.
<ul style="list-style-type: none"> ■ Have students use the <i>Flyer 1</i> image to explain the historic flight from takeoff to landing. <p>20 minutes</p> 		<ul style="list-style-type: none"> ■ Find a picture of a modern airplane. How does it differ from <i>Flyer 1</i>?
<ul style="list-style-type: none"> ■ Ask students who invented ice cream. ■ Read the article. ■ Discuss the questions on p. TG 3. <p>45 minutes</p> 	<ul style="list-style-type: none"> ■ Assign teams to handle different parts of the survey. ■ Compare survey results to those at www.makeicecream.com/15mospopicec.html <p>Time will vary.</p>	<ul style="list-style-type: none"> ■ Create a time line of your favorite food, using the “A Taste of History” reproducible (p. TG 7) as a guide.
<ul style="list-style-type: none"> ■ Read the article. ■ Discuss the questions on p. TG 6. <p>45 minutes</p> 	<ul style="list-style-type: none"> ■ Form student pairs. Have each pair learn about a reef species and create a small poster for a classroom display. <p>Time will vary.</p>	
<ul style="list-style-type: none"> ■ Ask students to define “tropical.” ■ Discuss where the term comes from. <p>5 minutes</p> 		<ul style="list-style-type: none"> ■ Complete the map crossword puzzle, p.23.

Coral Reefs: Cities in the Sea

Background

A coral polyp is a small, tube-like animal with a mouth and tentacles (for sweeping in food) at one end. The other end attaches itself to a hard surface. The polyp absorbs calcium from the water and turns it into a limestone exoskeleton. Assisting with this process are zooxanthellae (zoo zan THELL ee), algae that live inside the polyp's body.

When coral polyps die, their hard skeletons remain. Young polyps attach themselves to the old limestone, building skeletons of their own. Over millions of generations, the layers form coral reefs. Home to a quarter of all marine species, reefs are among the most diverse ecosystems on Earth.

Coral reefs benefit humans in many ways. Their fish and shellfish provide food—and jobs—for millions of people, and reef-related tourism is a major industry for many tropical nations. Reefs also protect coastlines by breaking up incoming waves that would otherwise cause erosion. The organisms living in coral reefs help scientists create new medicines.

Despite their importance, coral reefs are seriously at risk, and their imperiled health raises troubling questions about oceans in general. Overfishing, air and water pollution, and dense coastal development have all contributed to the destruction and degradation of coral reefs.

Discussion Questions

- How are coral reefs formed? (*Coral polyps absorb calcium from the ocean, turning it into limestone. They use the limestone to build external skeletons that remain after the polyps die. Young polyps attach themselves to the limestone, and the process begins again.*)
- What helps a coral polyp produce limestone? (*Algae living inside its body*)
- In what ways are coral reefs important to humans? (*They provide food and jobs for people. They protect coastlines. Chemicals from reef species help scientists create medicines.*)
- How can fishing be a threat to coral reefs? (*People catch too many reef fish. Fishing crews sometimes blow up parts of a reef to drag their nets more easily through the water.*)



- What is bleaching? (*When seawater gets too warm, polyps sometimes drive out the colorful algae living in their bodies. The reef then turns white and appears dead.*)
- Where are most of the coral reefs of the world located? (*Between the Tropic of Cancer and the Tropic of Capricorn*)
- Why does the author describe coral reefs as “cities”? (*Both reefs and cities are big places with impressive structures. Both have many and diverse inhabitants.*)
- People often compare coral reefs to rain forests. Why? (*Possible answers: Both are home to many species. Both have rich colors. Both are endangered.*)
- What could our class do to protect coral reefs? (*Answers will vary.*)

Book Links

Coral Reefs by Sylvia A. Earle (National Geographic, 2003; 32 pages).

World Atlas of Coral Reefs by Mark D. Spalding et al. (University of California Press, 2001; 432 pages).



Web Links

Dive into the Great Barrier Reef at www.nationalgeographic.com/ngexplorer/teachers.

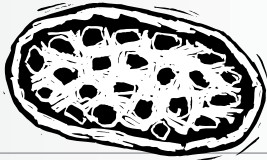
Name: _____

A Taste of History

We all scream for ice cream, but people like many other foods too. Each of those items has its own story.

Why not create a time line about one of your favorite foods? First choose your favorite food.

1. Read "Ice Cream" in the April–May 2003 issue of NATIONAL GEOGRAPHIC EXPLORER. That will give you a model to follow.
2. Use your library catalog, encyclopedias, and the resources listed below to learn about your food item.
3. Identify four or more key dates in the history of that food.
4. For each key date, fill out an index card. Give the date, a short title saying what happened, and several detail sentences that explain what happened on that date. See the example below.
5. Arrange the index cards in date order. Paste them to a piece of poster paper. Write a title above the time line. Add photos, drawings, or other decorations.

	
1905—First U.S. Pizzeria	
Five million Italians moved to the United States between 1880 and 1920. One of these immigrants, Gennaro Lombardi, opened the country's first pizzeria on Spring Street in New York City. His grandson runs the business today.	

Research Tools

Books

- Alan Davidson, *The Oxford Companion to Food*
- Martha Rose Shulman, *Foodlover's Atlas of the World*
- James Trager, *The Food Chronology*

Websites

- Food History Resources
homecooking.about.com/cs/foodhistory
- Food Reference: Facts and Trivia
www.foodreference.com/html/triviatips.html
- The Food Timeline
www.gti.net/mocolib1/kid/food.html

Curriculum Survey

We hope you and your students have found NATIONAL GEOGRAPHIC EXPLORER a valuable addition to your classroom. To help us connect to your curriculum, we would like to know when you teach some topics and skills. Please take a few minutes to complete the survey and return it to:

Editor (Room M-2412), NATIONAL GEOGRAPHIC EXPLORER,
1145 17th Street NW, Washington, DC 20036

In which month do you teach each topic?

	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
Environment										
Endangered animals										
Global warming										
Habitats										
Pollution										
Rain forests										
Recycling										
Geography										
Continents										
Countries										
Globe										
Hemispheres										
U.S. states										
Health										
Dangers of drugs										
Diet/nutrition										
Exercise										
Human body										
Map Skills										
Latitude/longitude										
Map symbols										
Scale of miles										
Topography										
Science										
Dinosaurs										
Earthquakes										
Newton's laws										
Organisms										
Space										
Volcanoes										
Weather										
Social Studies										
Cultures/countries										
Native Americans										
U.S. government										
U.S. history										
World events										
Other _____										

Name: _____

Zip code: _____

Grade: _____

Phone number: _____

School: _____

E-mail: _____

School address: _____

Would you like to be on our teacher

City: _____ State: _____

advisory board? yes no

Great Barrier Reef

NATIONAL GEOGRAPHIC EXPLORER ■ Online Adventure Scavenger Hunt

Student Form: www.nationalgeographic.com/ngexplorer/adventures

Source for answers: <http://www.nationalgeographic.com/earthpulse/reef/>

- 1. Find a creature that is poisonous to other animals.**
Possible answers:
 - cone snail
 - crown-of-thorns sea star
 - nudibranch
 - sea anemone
- 2. Find an animal that feeds on coral.**
Possible answers:
 - crown-of-thorns sea star
 - nudibranch
- 3. List two fish in that live in this habitat.**
Possible answers:
 - anemonefish
 - coral trout
 - titan triggerfish
- 4. Find a mollusk that does not have a shell.**
Possible answers:
 - cuttlefish
 - nudibranch
- 5. Name a creature in this habitat that changes color:**
 - cuttlefish
- 6. Name a marine mammal in this habitat.**
Possible answers:
 - bottlenose dolphin
 - dwarf minke whale
- 7. Find a creature that has tentacles.**
Possible answers:
 - cuttlefish
 - sea anemone
- 8. Name a fish that is overfished by humans.**
 - coral trout (a type of grouper)
- 9. Find a fish that relies on another creature for protection and shelter.**
 - anemonefish (relies on the sea anemone)
- 10. Which animal attacks its prey with a sharp, spear-like tooth?**
 - cone snail